

# FLIGHT

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## Practice Makes Perfect

THE Air Exercises have been peculiarly interesting this year because of the number of new experiments which were made. Most notable among these was the institution of standing patrols of fighters by day. It may be some time before the various staffs have digested the results and decided whether this new form of tactics is likely to be a success, but it was certainly interesting. This was also the first time that the latest group of the Observer Corps to be formed, that in Norfolk, was thoroughly tested. Another interesting experiment was trying out an alternate means of communication, when the normal means was supposed to have broken down. This is reported to have worked well. By day the number of interceptions of raids by fighters seems to have been satisfactory, and all the indications, except one, are that, despite the increased and increasing speed of light bombers, our defence is by no means so negligible as many ill-informed politicians have lately been proclaiming. There are definite grounds for expecting that we could hit a raiding force so hard that its losses would soon diminish the intensity of the attacks. We must, of course, presume that when fighters do intercept bombers, the former will have the best of the fight, numbers being approximately equal. On such a point as that the Air Exercises naturally shed no light.

Optimism as regards defence is increased by the fact that such success as was achieved was accomplished without many of the aids on which the Fighting Area would be able to rely in real war, namely, the counter-attack, anti-aircraft guns, and the psychological effect of casualties on the raiders. The last argument may be called two-edged, for the fighters would suffer casualties, too, but psychology here favours the defence. Men defending their own land and homes, as the fighters would be doing, are wont to fight more grimly and with less regard to losses than is usually the case with assailants. Moreover, in an air defence campaign, the fighters would not be subjected to the nerve-wearing

effects of anti-aircraft gunnery, of which the raiders would enjoy the monopoly.

In one respect the recent Exercises were little better than farcical, and that was the absence, from all but two points in Kent, of searchlights. As a result, such night bombers as were not ordered to come near Manston or Tilbury had things all their own way, and were never likely to be intercepted at all. It is a maxim of air warfare that by night there can be no expectation of interception by fighters unless searchlights, guided by sound-locators, point out the raider. The showing of navigation lights by the bombers is no adequate alternative, for these little glimmers cannot be seen from far away.

## The Vital Matter

The whole trouble is the division of responsibility in the vital matter of air defence between the Air Ministry and the War Office. The War Office decides when the searchlight battalions of the Territorial Army shall go into camp, and the Air Ministry has no say in the matter. When, as on this occasion, the War Office only sends one of these battalions into camp during Air Exercises, the whole of the night raiding practice becomes nugatory. The night bombers were left to fly at their will and unmolested except up the Thames estuary. It was not fair on the bombers for one thing, but still more important was the loss of practice in combined exercises by the Territorials and also by the night fighters. In air defence seconds are of importance, and seconds can only be saved if practice is sedulous and thorough. It is taking some risk to entrust such an important item as the searchlights to non-regular troops, but to deprive them of their most important annual practice is outside the bounds of reason. Unity of command is the only way to avoid such mistakes, and unless and until the guns and searchlights are handed over, bag and baggage, to the Air Ministry, an outbreak of war will find London in very great danger from raiding bombers. The matter is vital, and the ruling consideration ought not to be the reluctance of the War Office to give up troops who are an essential part of air defence.

## The Air in the House

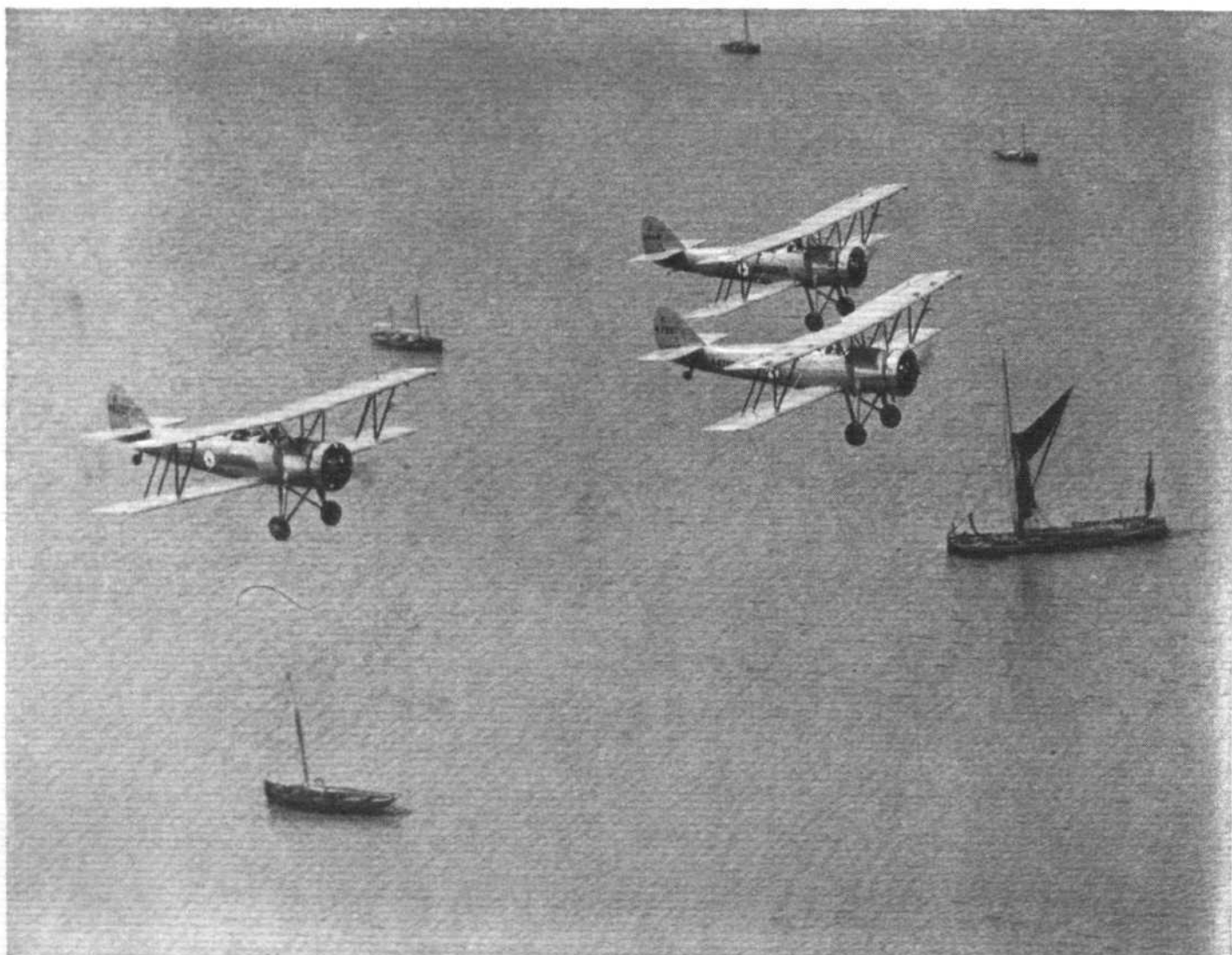
**A**DVOCATES of national aircraft factories found a good opportunity to advance their claims during the debate on the Supplementary Air Estimates in the House of Commons last week. They did not, however, succeed in convincing anyone but themselves that the establishment of such factories is either desirable or practical. Sir Philip Cunliffe-Lister, the new Secretary of State for Air, quoted instances from the last war in which machines built at Government factories cost £5,000 as compared with £1,250 when built by an ordinary manufacturing firm, and Sir Philip Sassoon, Under-Secretary of State for Air, afterwards pointed out that, even if national factories were deemed desirable, it would be impossible to get them set up and in production order in time to be of any use for the present expansion programme, which contemplates being complete in two years or so.

For the rest, the debate did not produce anything of outstanding interest. There was, of course, the usual talk of an international police air force, and lamentations that civil aviation has not been internationalised, but of helpful practical suggestions there were few. Capt. F. Guest deplored that so little money was being spent on the development of commercial aviation, to which Sir Philip Sassoon replied that, although but £500 was shown in

the Supplementary Air Estimates, he would remind Capt. Guest that in the Air Estimates presented last March there was an increase for Civil Aviation of £116,000. He thought this a good and definite sign that the questions of ground organisation and ancillary equipment would be dealt with.

Mr. O. E. Simmonds did good work by pointing out the fallacy that civil aviation bears the same relation to the Air Force as does the Mercantile Marine to the Royal Navy, and quite rightly said that, while civil aviation was so small in relation to Service aviation, it would be fantastic of the Government to expend its efforts in that direction when it had the opportunity of going forward and achieving an agreed limitation, such as had been attained in the Naval Pact with Germany. In this view he was supported, indirectly, by Sir Philip Sassoon, who made the very telling comment that, whereas the Air Force expansion was a short-range programme, civil aviation demanded a long view and planning for the future rather than the present.

One may express the hope that the Fisher Committee on the international aspects, and the Maybury Committee on the internal air-line problems, will live up to the title "Council of Action" which the Secretary of State for Air coined at Newcastle the other day. Heaven forbid that we should mix up civil and Service aviation in the way some M.P.s seem to prefer.



FROM ISIS TO SWALE: The Oxford University Air Squadron is now encamped at Eastchurch in the Isle of Sheppey, and its Avro "Tutors" range over the waters of the Thames estuary. Here a flight is seen over a line of red-sailed barges which have just emerged from the Swale channel. An article on the O.U.A.S. appears on pages 118 and 119. (Flight photograph.)

# The Outlook

## A Running Commentary on Air Topics

### The Diesel

**A**LMOST universal agreement with the leader published in *Flight* last week is expressed in letters from a number of well-known technicians published in this issue. Mr. Fedden has done us the honour of writing at very great length on the subject of the Diesel engine. He, if anyone, should be prejudiced in favour of the compression-ignition type of engine, having himself produced a very successful engine of this class, but he faces facts and admits that, with 100-octane petrol fuels likely within the next year or so, there are no grounds upon which to build any hope that, however desirable it might be for the purpose of reducing fire risk, the Diesel engine can compete with the petrol engine except on flights of several thousand miles' range. As there is no reason to think that such ranges will be commonly demanded in the near future, the delay in the adoption of the Diesel would seem to be inevitable.

### Concerning Etiquette

**F**LYING meetings are held every week-end at this time of the year. Many private owners visit them by air. Many arrive late, after the displays have started. They sometimes announce their arrival by a dive across the middle of the aerodrome, and quite frequently we have seen it done while an aerobatic display was actually in progress.

Such behaviour is not only in the worst of bad taste, but is also dangerous. Visiting pilots would do well to remember the difficulties of the management on these occasions; politeness costs nothing. If they must arrive late—an unfortunate thing to do, in any case—then they should circle well clear of the aerodrome until any flying event which is in progress at the time of their arrival is finished.

### Killing A.N.D.II

**A** QUESTION which has been in the minds of very many during the last few months is what attitude the Air Ministry will adopt towards the building and flying of "Pou-du-Ciel" and similar small aircraft. In France, where the "Pou" has already made much headway, the Air Ministry has granted permission for these machines to operate from recognised aerodromes, so long as they do not interfere with the regular traffic. There were many who feared that our own Air Ministry would not show the same understanding of what the "Pou" represents, and that an obstructionist policy would be pursued. It would appear that these fears were groundless, for we learn that the Air Ministry has expressed to individuals (although no official pronouncement has yet been made) its readiness to co-operate in the new movement by granting the greatest possible freedom to experimenters.

One thing, we gather, the Air Ministry does insist upon, and that is third-party insurance. This is all to the good, and as it should be. The sum of £5,000 has been mentioned. At first sight this may seem a little staggering, but actually the premium which the insurance companies demand is so modest that it cannot be said to constitute a serious obstacle.

It was *Flight* which, some years ago, first called attention to the preposterous claims, in A.N.D.II, of the Air Ministry to decide whether or not an experimenter

might fly his own aeroplane over his own land without first getting official permission. We are pleased to think that by our agitation the Gorell Committee was established and that now some of its recommendations are to be given practical expression.

### Racing Turns

**A** CORRESPONDENT last week thought that we exaggerated the evil of tight turns in races. We can assure him that we did not do so. We had in mind many machines such as Miles "Hawks" with "Gipsy Six" engines, "Mew Gulls," and others which often approach turns at over 180 m.p.h. At this speed the average amateur pilot loses a very considerable amount of speed if he makes a really tight and spectacular turn—a failing of most comparatively inexperienced pilots.

Our correspondent overlooks the fact that most of the machines under discussion are monoplanes, although he admits that 200 m.p.h. is approximating to Schneider Trophy (he says "Race" but, of course, means "Contest") conditions. Let him work out the difference between the handicap speeds and the actual speeds for various types of machines, noting particularly the results achieved by various pilots; he will then see our point.

One of the most consistent performers in these light aeroplane races is Mr. C. S. Napier, who, flying his Hendy 302 over a short course with many turns, probably loses as little time as it is possible to do.

### Coastal Defence

**T**HERE is abundant evidence that the Royal Air Force is becoming increasingly interested in coastal defence. The majority of the new general-purpose aeroplanes submitted for official test can be used for torpedo dropping—a job quite foreign to their predecessors now in service—and dive bombing, too, has influenced design. This latter method of attack, of course, can be employed to particular advantage against warships. An inspection of some of the new "G.P.'s" reveals stowage for collapsible dinghies and flotation gear, as employed on the machines used by the Fleet Air Arm from aircraft carriers.

This over-water torpedoing and bombing is, of course, a duty additional to the normal lengthy list of tasks which fall to the lot of general-purpose aircraft. This list includes bombing, reconnaissance, photography, army co-operation and sometimes, on a small scale, ambulance work. Incidentally, some of our very latest general-purpose types will carry four soldiers with their equipment.

Concurrently with the tests of these torpedo-carrying "G.P." machines a completely new class of aeroplane is being introduced into the Royal Air Force—the coastal reconnaissance type. The Avro works now have a very large batch of 652A monoplanes under construction for the equipment of several units. Two supercharged Siddeley "Cheetahs" give a speed of over 190 m.p.h.

The coastal reconnaissance machine is intended for high-speed reconnaissance missions, has a long range, carries light defensive armament, and, if necessary, a small bomb load. The work of the first units to be equipped will warrant the attention of the student of naval and military operations. Shall we see flying boats eclipsed, for coastal reconnaissance work, by landplanes?



# OXFORD AND ITS "TU

*A Visit to the Oxford University Air Squadron in Cam*

By MAJOR F. A. de V. ROBERTSON, V.D., M.A. (OXON.)

11611<sup>s</sup>



A flight of three "Tutors" of Oxford University Air Squadron off the coast of Kent. The convoy of barges has just emerged from the so-called river Swale, which separates the Isle of Sheppey from the mainland. (*Flight* photograph.)

OXFORD men, when "up," usually regard the Dons with not unkindly tolerance, but members of the Oxford University Air Squadron confess to a much warmer feeling for the "Tutors" (of the Avro variety) which last year replaced the "Atlases" as standard flying equipment. The "Tutor" is easy to fly and to maintain, and can be used for both elementary and fairly advanced instruction. The O.U.A.S. possesses thirteen of them in first line, and three more in reserve.

*Probably H similar to 11614<sup>s</sup>*



In the first four weeks of the annual six-weeks' camp at Eastchurch quite a number of new "Tutors" completed 120 hours' flying and had to go for overhaul.

Eastchurch is quite a pleasant place in fine weather, and this year the weather has been glorious. The seventy-five members of the squadron (soon probably to be increased to 100 under the R.A.F. expansion scheme) are divided into three batches of twenty-five each, and each batch goes to camp for a fortnight. The third batch is now in its second week. The staff and the members are accommodated in the station quarters and are not living under canvas. Each of the first two batches compiled an aggregate of six hundred hours' flying during the fortnight, and the present batch is likely to do quite as much. Flying is carried out on five days a week, from Monday to Friday, starting at 6 a.m. and finishing at 1 p.m., and in the fortnight each member has averaged about twenty hours' flying, and that mostly solo. In the afternoons

the members attend the maintenance and inspection of the aircraft, and sometimes are given lectures, but ground instruction and dual flying are the regular concerns of term time, and camp is devoted almost entirely to solo flying.

On the range at Eastchurch. The O.U.A.S. is not a military body, but as the Air Armament School is at Eastchurch, the members do a little rifle practice. (*Flight* photograph.)

RS"  
urch

Members are not allowed to fly solo in term time until they have taken their proficiency certificates, which means passing examinations in airman-ship and theory of flight, air navigation, aircraft construction and maintenance, and engine construction and maintenance, followed by qualification to fly solo at camp. Most members now obtain their certificates at the end of their first year.

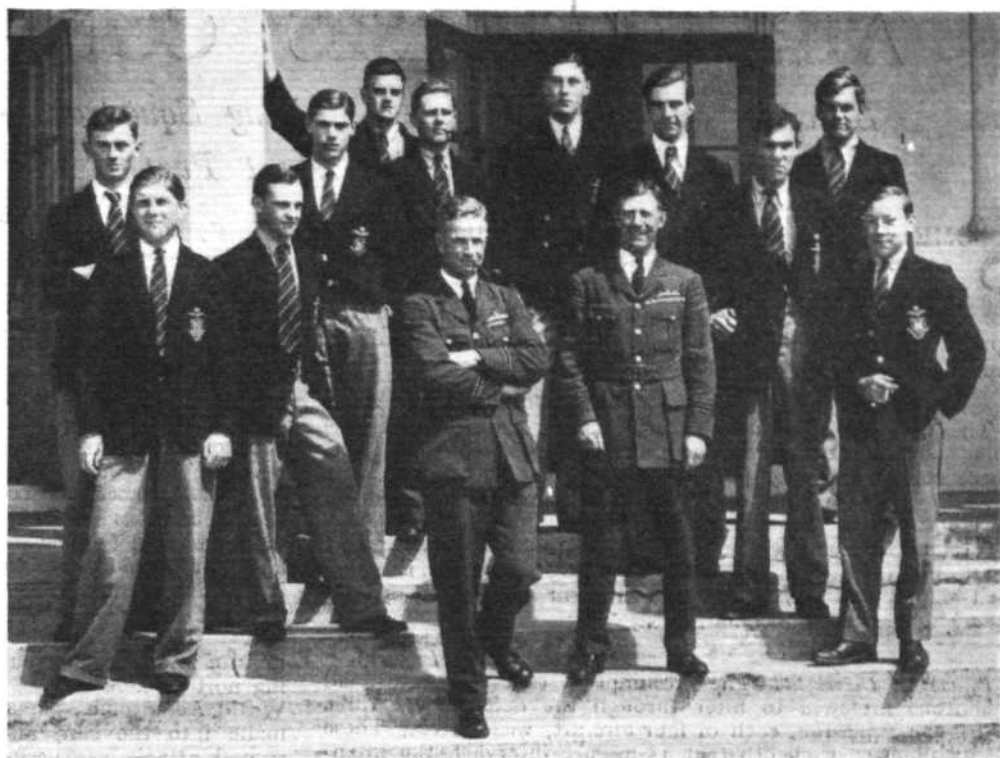
At the beginning of this year's camp there were about forty undergraduates out of the seventy-five who had to be passed out as soloists, and most of them were able to put in fifteen hours' solo flying in their first camp. This speaks volumes for the efficiency of the instruction given by the flying instructors, for the keenness and ability of the Oxford men themselves, and for the work of the airmen of the Abingdon Station Flight who keep the machines and engines in flying condition. In fact, keenness is the outstanding impression given by a visit to the O.U.A.S. camp at Eastchurch. Wing-Commander C. N. Lowe, M.C., D.F.C., the Chief Instructor, is himself keenness personified, and all ranks as well as the members of the squadron obviously share his enthusiasm. Incidentally it was gratifying to see among the flying instructors from the Abingdon Station Flight an officer who only a few years ago was himself an undergraduate member of the O.U.A.S.

It is only recently that Abingdon has become the aerodrome used by the O.U.A.S. during term time. Previously it was Upper Heyford, which is farther away from Oxford and was much less convenient. Excellent arrangements have been made for transporting out to the aerodrome members who have not cars of their own, arrange-

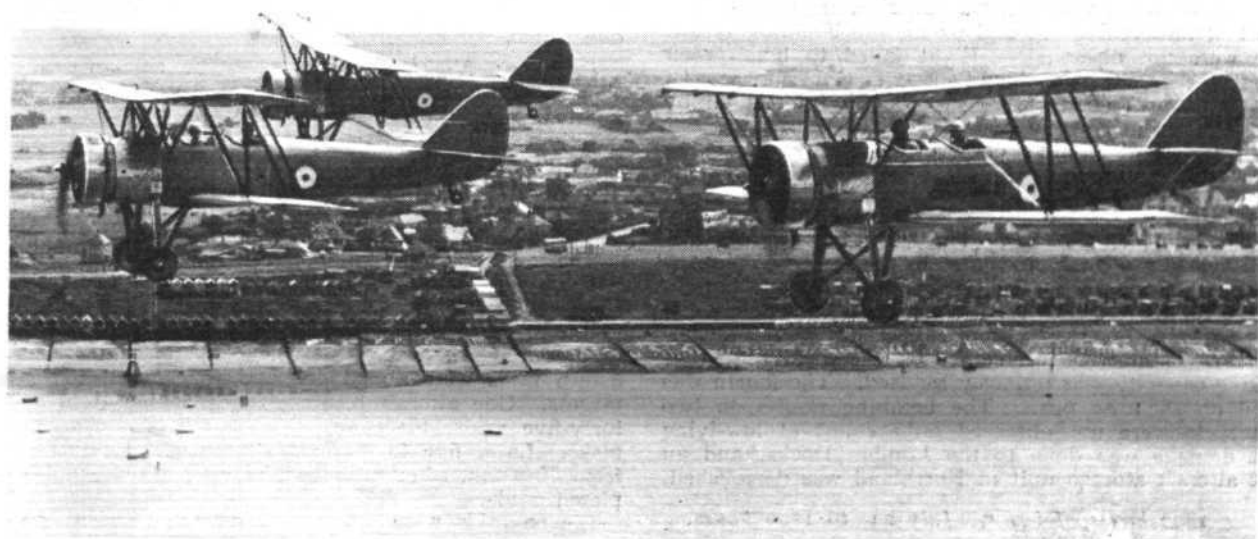
ments which are both speedy and also economical for the men as well as for the Government. Each member is expected to do at least eight hours' dual flying every term, which means an hour a week. The ground instruction is given at the headquarters at Manor Road, Oxford.

During the past year nine members of the squadron applied for permanent commissions in the R.A.F., and five were accepted. A number of men intend to apply for commissions in the Reserve as soon as they go down. The Auxiliary Air Force also finds the O.U.A.S. a good recruiting ground, and there is a particularly close liaison between the squadron and No. 601 (County of London) (Fighter) Squadron, among whose officers there are five old O.U.A.S. men.

There are a number of Blues and Half-Blues in the squadron, and also men notable in other circles. All really good men are welcomed, and members of the squadron get the best flying training for £3 per annum.



The Chief Instructor, Wing-Commander C. N. Lowe, M.C., D.F.C. (right centre), and the Chief Flying Instructor, Flt. Lt. G. M. Klocker, with some members of the O.U.A.S. outside the officers' mess at Eastchurch. (Flight photograph.)



Whitstable as seen from the air, with a flight of the Oxford "Tutors" coasting along. (Flight photograph.)

# AIR EXERCISES CONCLUDED

## *Successes and Failures of the Raiding Squadrons : Weather Plays an Important Part*

**S**OME valuable lessons were taught by the 1935 Air Exercises which concluded at 18.00 hours on Thursday of last week. The extracts below give the bulk of the Air Ministry narratives of the course of the operations, and a leading article on the Exercises will be found on page 115.

*2200 hours. Monday, July 22.*

The weather is all on the side of the attackers, stratus cloud covering the whole sky at from 3,000 to 5,000 feet. These clouds not only provide covering for the raiders, but make it more difficult for the ground observer organisation to identify and plot the courses of the raiders.

It is normal to provide flare paths for aircraft landing at night, but at Biggin Hill a flood-lighting apparatus is being used experimentally, which can at will be doused should enemy appear in the vicinity.

*1200 hours, July 23.*

*Phase 1: Daylight.*—The presumption that two Southland squadrons intended to filter through the defences by three flights per squadron, each of four aircraft, was correct. These flights followed each other at 15-minute intervals, the intention being for the first flight to draw off the defence. This was not altogether successful, as Northland fighters made contact with some of the flights. The objective at Tilbury was, nevertheless, heavily bombed, and the target at Halton was also hit.

Two Southland raiding formations successfully attacked Northland aerodromes at Northolt and North Weald, which would have caused serious inconvenience to Northland fighters had they not taken off on sighting the enemy and engaged them.

Three Southland squadrons reached London objectives unopposed, direct hits being made on one of them. The attack on the other two caused only minor damage. The raid which was directed to the Air Ministry encountered strong opposition on its way. The squadron claimed to have made a direct hit from 13,500 feet, but was not observed from the ground.

*Phase 2: Night.*—The night was overcast, with stratus cloud covering most of the area. The height of the cloud varied from 2,000 to 3,000 feet. Visibility in general was good at first, but ground mist began to form and later developed into fog over the South Coast and Salisbury Plain. Intelligence Reports stated that Southland intended to make forty-three raids on Northland, but on account of low cloud and fog nineteen turned back and failed to reach their objectives. Of these two reached the fighter line and were attacked by Northland fighters. Three other raiders were forced down by bad weather on emergency landing grounds in Northland and were taken prisoner.

Twenty-one Southland raiders reached their objectives, but, on account of intervening fog and cloud, the bombing results of twelve were not observed. Eight failed to bomb their targets, but one bombed Northland's seat of Government. Of the twenty-one raids eleven were successfully intercepted by Northland fighters in spite of poor visibility.

The difficulties of ground observation became acute at 2 o'clock, and the ground observers were ordered by the directing staff to close down.

*Phase 3: Daylight, Morning.*—The early fog did not disperse until nearly 7 o'clock, and later in the Oxfordshire area, which resulted in three raids being cancelled and one becoming inoperative, as it could not return to its base before the operations ceased. Four raids were carried out at full squadron strength. Three were intercepted on the way in, so that their striking capacity was seriously reduced. The fourth was intercepted on the way out. The bombing results on two London targets were not observed on account of low-lying haze, but damage was done to the London Docks, and an important aircraft storage unit of Northland was demolished.

*1800 hours, Tuesday, July 23 to 1100 hours, Wednesday, July 24.*

*Phase 1: Daylight. July 23.*—The evening was fine, with

a partly covered sky and a light south-south-westerly wind. Slight ground mist was visible in some districts.

Raids were undertaken by six squadrons during the evening phase, and, in addition, the A.O.C. Southland decided to employ two squadrons to maintain the offensive during the period between the operation of day bomber squadrons and night bomber units. In previous exercises there has been a lull at dusk (and again at dawn), and the continuation of raids in this way by Nos. 40 and 101 Squadrons enabled this gap to be effectively bridged.

One "Gordon" Squadron, spaced by flights at half-hour intervals, crossed the coast at Cromer going in behind London to attack Hendon. The first flight was intercepted both on its way in and out, but reached the target. The second and third flights delivered their attack without interception in or out; the former missed its mark, but the latter obtained a direct hit.

A "Hart" Squadron, operating by flights at fifteen minute intervals, crossed the coast *via* the Solent and, swinging north, made a series of diving bombing attacks on North Weald Aerodrome. The first attack was somewhat open and made into the sun, and failed to achieve surprise. The second attack was very good, and steep; being made from the direction of the sun it achieved complete surprise. The third attack was even more open than the first, because the second and third aircraft turned about after the leader's attack. Each of the single aircraft attacks were made into the sun. All three flights were engaged by Northland fighters on their way in.

The second "Hart" Squadron was gallantly attacked by a single flight of "Demons" on its way to Duxford, where it carried out a diving bombing attack which, however, was only partially successful, as the attack failed to achieve surprise and some of the aircraft overshot their target.

A fourth "Hart" Squadron attacked the Air Ministry from 16,000 feet, but failed to score a hit. The squadron was not intercepted.

### *Fighting at 12,400 feet.*

Two "Gordon" Squadrons, after a long flight over Northland territory, attacked Cardington and Dagenham respectively. Cardington only was hit. The raid on Dagenham was intercepted, both on the way in and out. The Day/Night Squadron No. 101 crossed the coast near Bournemouth, coming in behind Northland's defences, and made for Tilbury Docks, but the raid apparently miscarried, as the aircraft were not seen over the target. They were intercepted in the vicinity of the target.

The average height at which combats have been taking place during this phase is 12,400 feet—somewhat higher than combats in previous Air Exercises.

This completed the first phase of 48 hours' continuous operations.

*Phase 2: Night. July 23-24.*—The calm weather conditions at dusk indicated the probability of fog. Forty-five night bomber raids by single aircraft left their bases before midnight, the majority crossing the coast between Littlehampton and Folkestone, and being directed against the London targets at Dagenham, Park Royal, Air Ministry, Hendon and Tilbury, and the remainder making for Halton, the capital of Northland, and Cardington, respectively.

The meteorological forecast was that fog would occur over Salisbury Plain before midnight, subsequently spreading to the East Coast and affecting Mildenhall. The directing staff therefore ordered all aircraft from the Salisbury Plain aerodromes and Mildenhall to be back by midnight. As a result fifteen raids were abandoned and four failed to reach their targets. One aircraft returned with engine trouble. Of the forty-five raids, therefore, only twenty-five completed their tasks. Later five further raids were successfully undertaken from Manston, after midnight, making a total of thirty completed raids.

Eleven raids were intercepted on the way in or out, but many more combats were claimed by the fighters which were not confirmed by the bombers.



*Phase 3: Daylight (to 1100 hours, July 24).*—From dawn to 1100 hours the sky was overcast and most of the area was covered with ground mist, reducing visibility to less than one mile in the Salisbury Plain and London areas. As a result the first daylight raids were postponed two hours and the second series one hour.

During this period eight squadrons were ordered to concentrate on targets in the vicinity of London. These raids were routed to begin from the extremities of Northland, some commencing from the N.E. coast and the remainder from the south-west corner.

Seven of the eight raids were intercepted, six on the way in and one in the vicinity of the target. This last raid was carrying out a squadron diving bombing attack on North Weald Aerodrome.

A "Hart" Squadron was intercepted twice on its way to carry out a diving bombing attack on Northolt Aerodrome. Having skillfully used the haze and sun to screen its approach to the target, the squadron lost some measure of surprise by partly circling the aerodrome during the actual attack. It may be that the haze at 3,000 feet had temporarily obscured the target, compelling bombers to swing round out of the sun.

#### *Morning Phase, Wednesday, July 24 to Morning Phase, Thursday, July 25.*

*Phase 1: Morning, July 24.*—The diving bombing attack on North Weald, referred to above, which took place at about 0600 hours, was made in two phases. The first, carried out by six aircraft, was completed in 40 seconds, and the second, by three aircraft, in 25 seconds. Both attacks were effective. The squadron was intercepted on the way out.

The medium bombing squadron was intercepted twice on the way to Wimbledon and once on the way out. The result of the bombing was not observed, as this particular target is extremely difficult to locate.

Three "Gordon" squadrons attacked Hendon, Tilbury Docks, and Air Ministry at a height from 13,800 feet to 15,200 feet. All three were intercepted on the way in and two on the way out. Both the accuracy of bombing and of recording results were affected by intervening clouds of mist.

A "Hart" squadron attacked Park Royal from 13,400 feet. The squadron was twice engaged by fighters on the way in.

Another "Hart" squadron came in over the coast at Selsey Bill and attacked the Dagenham target from 19,200 feet, and escaped without encountering Northland fighters.

#### **Communications Cut**

*Phase 2: Midday, Wednesday, July 24.*—During the mid-day period Southland concentrated attacks on targets in London and at Halton by routing the bulk of the bombers in small formations from the East through the narrow sector of the Thames Estuary. Out of eighteen raids eight were intercepted on the way in and seven on the way out. The intervening haze again made it very difficult to observe bombing results.

A "Hart" Squadron, operating in three flights at about twenty-minute intervals, made a diving bombing attack on Northolt. Each attack took 15-20 seconds and scored 80-85 per cent hits. The attacks were good. Two flights were intercepted, one on the way in and another on the way out.

Another "Hart" Squadron, attacking by three flights at unequal intervals, scored 100 per cent hits on North Weald. The fighters took off on sight and claimed combats, only one of which has been confirmed.

As a result of this attack the communications between the Station and the A.O.C., Northland, were adjudged by the Directing Staff to have been put out of action at North Weald for two hours. Within a few minutes an emergency system of communication had been brought into operation and arrangements made for standing fighter patrols until 1430 hours, when A.O.C., Northland, resumed control. During this period the standing patrols made five interceptions, thereby indicating that the defence in this sector had not been materially affected by the interruption of communications.

About the same time the neighbouring Northland Station, Hornchurch, also suffered a temporary breakdown in communications, and a similar procedure of standing patrols was adopted, which also achieved five interceptions.

A "Gordon" squadron of three flights attacked Park Royal from heights between 11,000 and 14,500 feet. One flight was attacked on the way in and again on its way out. Another "Gordon" squadron, in two flights, made high-altitude attacks on Hendon and were intercepted six times, only one of which was on the return flight.

A third "Gordon" squadron, in three flights, attacked Hendon from heights between 4,000 and 12,000 feet. All flights were intercepted on the inward journey, five combats taking place. The target was hit.

Three "Hart" squadrons attacked Dagenham (from 19,500 feet) and Tilbury Docks (from 14,000 to 16,000 feet). All reached their objectives unintercepted, but two were attacked on the way out.

The medium bomber squadron attacked Tilbury Docks and was engaged twice on the way in and twice on the way out.

*Phase 3: Daylight—Evening, Wednesday, July 24.*—Some hours elapsed before the last Southland raids were made. The late afternoon was fair, with light winds and few clouds, but haze persisted over the whole area of operations, with slight local mist at Manston. Visibility on the ground was good. The poor visibility in a vertical direction interfered with the assessment of the bombing results.

Southland again sent in their raids in small formations, totalling nineteen, and made up from eight squadrons. Many of the approaches were dog-legged in order to avoid disclosing the ultimate objective of the raid. The six London targets were attacked, as well as Halton and Cardington.

A similar method was used to bridge the gaps between day and night operations as was employed last evening. Nos. 40 and 101 Squadrons were again used.

#### **Poor Visibility**

During this phase the "Gauntlet" Squadron attacked a "Hart" Squadron coming in at 20,800 feet. The engagement was confirmed. The raid arrived over the target at the same height but found the visibility too poor to identify it.

Two other "Hart" formations made their approach to the Air Ministry at 16,000 feet, but actually bombed from 5,000 feet. No hits were recorded.

Three "Gordon" Squadrons attacked Dagenham, Halton and Park Royal with eight formations.

Four "Hart" Squadrons delivered attacks on Wimbledon, the Air Ministry, Hendon and Halton. Five out of the nine attacks were intercepted at least once on the inward flight. Poor visibility prevented bombing results being assessed.

No. 101 Squadron, in two formations of "Sidstrand" and "Overstrand," attacked Tilbury Docks from 11,000 and 14,000 feet respectively. The higher flight was intercepted on the way in by fighters of the Auxiliary Squadron No. 601. The result of the bombing was not observed on account of failing light.

In order to give more practice to Nos. 16 and 18 Observer Groups, Nos. 9 and 10 Squadrons were despatched from Salisbury Plain to operate from Mildenhall.

*Phase 4: Night, July 24-25.*—It was a fine night, but with some mist in the valleys. Fog formed at Duxford, on the East Coast of Norfolk and in Kent, but did not become more general.

A fairly large proportion of raiders were scheduled to pass over Norfolk after midnight to exercise the new Observer Group No. 18, but ground mist and fog prevented the departure of many of these aircraft. The Directing Staff instructed this group to close down at 0200 hours.

Mist at Manston also involved the cancellation of some raids. Sixty-seven raids were, however, completed by single aircraft and one by a formation of three. One or two aircraft landed at other than their home stations on account of fog. Out of these sixty-eight raids twenty-seven were intercepted; the total number of confirmed combats was thirty-seven, and the fighters claim a further twenty-four. The best performances of this phase were made by No. 58 Squadron, who scored six hits in eight attacks, and No. 9 Squadron, three hits out of five attacks. The target in both cases was the Air Ministry.

During this phase sixteen raids took place at 16,000 feet, and sixteen raids between 10,000 and 16,000 feet.

#### **Not Enough Searchlights**

In connection with this phase the Air Officer Commanding-in-Chief, Air Defence of Great Britain, desires the following observations to be noted:—

"The proportion of interceptions to raids during the night phases of this Air Exercise is no real criterion of what might be expected in war, because of the restricted use of searchlights. These are manned by Territorials whose training requirements this year did not permit of their participation in the Air Exercises. Consequently the attacking bombers

(Continued on page 128)

# THE AVRO 636

*Flying a New Two-seater  
Fighter Trainer : Excellent  
Manœuvrability With High  
Performance*

By C. N. COLSON

HIGH performance is not always compatible with manœuvrability. The former can relatively easily be obtained by designing an aeroplane which is devoid of all excrescences, which is small, clean aerodynamically, and therefore has little resistance to being pulled through the air by its airscrew—in other words, a machine which has a very low total drag.

High performance is, however, not the only desirable feature of a fighting aeroplane. It must be easy to manœuvre so that it can out-fight its opponents without imposing on the pilot any undue strain. Obviously a pilot is far better able to work his guns and generally to be at his best in a fight if the machine he is flying is one in which he feels perfectly at home, regardless of whether he is upside down, right way up, or sideways, and if it is one which virtually flies itself without getting into difficulties.

Unfortunately it is far easier to design an aircraft with these desirable manœuvrability characteristics when that aircraft does not have to fly very fast than it is to design a modern high-speed machine which may frequently be flying at speeds of over 250 m.p.h. At such speeds it is very easy to produce controls which, while perfectly adequate at low speeds, get so heavy when the speed is increased that the pilot not only has to accustom himself to a new set of conditions but may also have actual difficulty in operation. On the other hand, controls may be so over-balanced, in an attempt to make them light to operate, that they may actually take charge at high speeds

and could then be the cause of a serious accident.

It will be seen, therefore, that the lot of the designer of machines in this class is by no means a bed of roses.

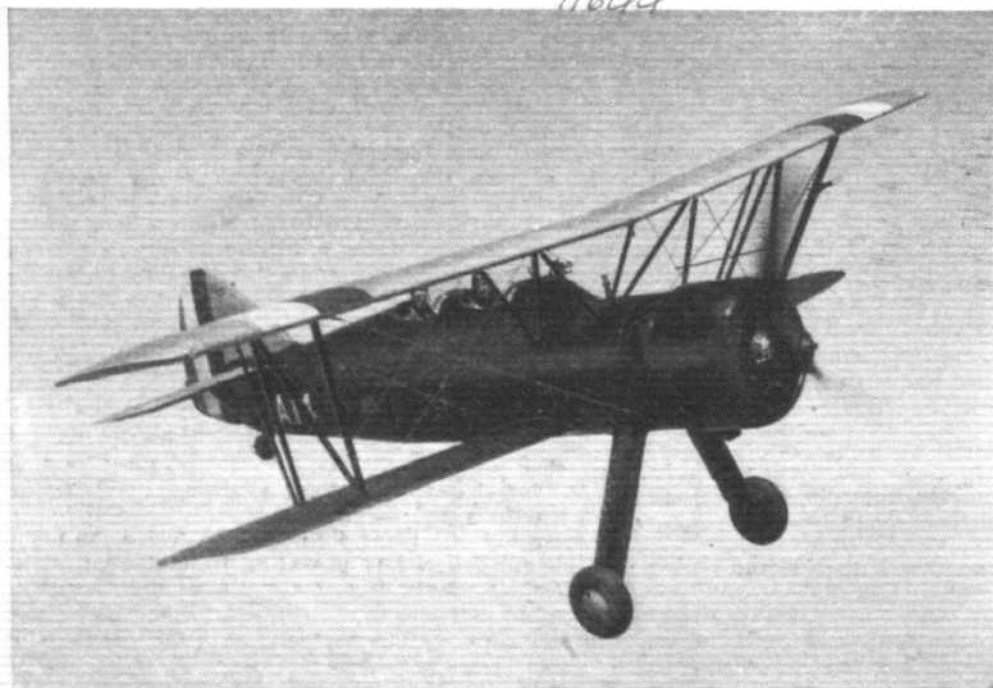
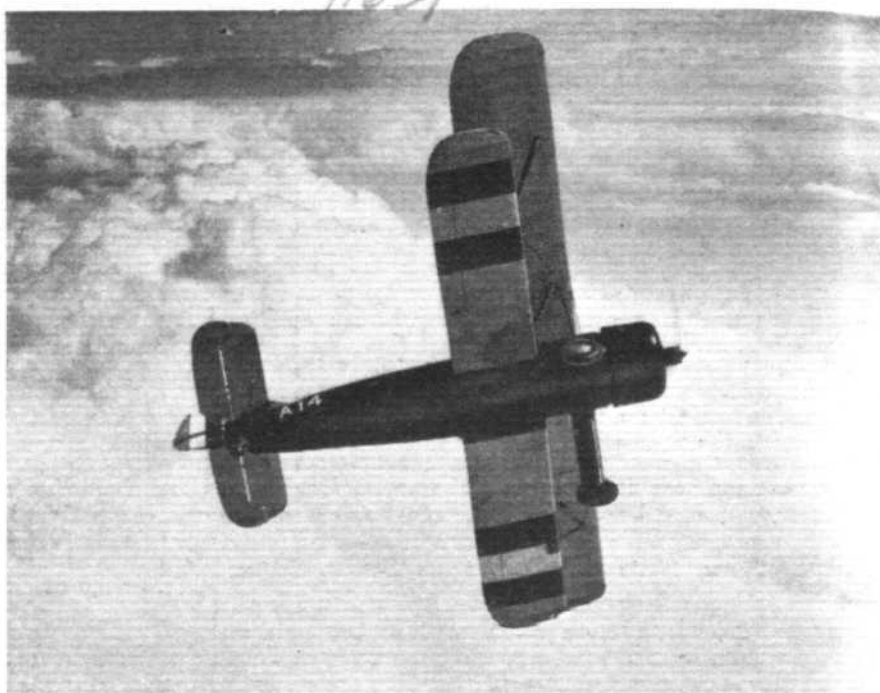
For some years now there has been a marked tendency to produce monoplane fighters—particularly on the western side of the Atlantic Ocean—but English designers have yet to be convinced that the monoplane can be made as manœuvrable as the biplane. For that reason we still pin our faith, in the main, to biplanes when manœuvrability is one of the chief desiderata. Nevertheless, despite the apparent advantages of the monoplane as a means of acquiring speed, our biplanes have proved themselves little, if at all, inferior in this respect.

I recently tried out the new Avro 636. This is a two-seater which has been designed primarily as a single-seater fighter. That sounds somewhat of an anomaly, but the second seat has been arranged in such a fashion that the performance of the machine is not impaired as a single-seater, with the added advantage of a rear cockpit, which can be uncovered when desired and the dual controls brought into use for instruction. The 636 is, therefore:

(1) a single-seater fighter of high performance, (2) a two-seater dual-control machine which can be used for instruction in high-speed aerobatics, gunnery, light bombing, and every phase of a fighter pilot's training. Further developments are under consideration whereby the same machine may be used for bombing and army co-operation work or as a two-seater fighter.

A. V. Roe and Co., Ltd., have, as *Flight* readers know, specialised for many years in the production of training aircraft. They feel that the time has now come when there is a demand for a training machine which will, as a two-seater, reproduce the flying characteristics

This view of the Avro 636, one of those shortly being delivered to the Irish Free State Air Force, shows that the occupants of both cockpits have an excellent outlook. (*Flight* photograph.)







Looked at from the side, the Avro 636, except for the cantilever undercarriage, gives little hint of its outstanding performance. (*Flight* photograph.)

and performance of the modern high-speed fighter, and the 636 is their idea of a machine which will fill this demand. The correctness of their diagnosis of the requirements is shown by the fact that the authorities controlling the Air Force of the Irish Free State have already bought four of the type.

With a top speed of up to 230 m.p.h., according to the

type of engine installed, the 636 is no sluggard, and the production of a two-seater of this class with a performance as good as many of the world's single-seater fighters must be considered an outstanding achievement.

Structurally, the 636, as would be expected, follows Avro practice. The fuselage is a welded steel tube structure, covered with doped fabric stretched over wooden



Exceptionally roomy cockpits are a feature of the Avro 636. Adjustable seats and rudder bars make the flying position comfortable for any pilot. (*Flight* photograph.)

## AVRO 636

Engine:—(a) Siddeley "Jaguar VI.C," 460 h.p. at 2,000 r.p.m. at sea level.

(b) Siddeley "Panther XI," 640 h.p. at 2,250 r.p.m. at 12,000 ft. (3,657 m).

"Panther VI," "VII," "X," or "XI" may also be fitted.

PERFORMANCE.			AREAS.		
	(a)	(b)		sq. ft.	m <sup>2</sup>
	m.p.h.	m			
Max. speed at sea level	175 (282)	187 (301)	Main planes with ailerons...	261.00	(24.28)
Max. speed at 14,000ft. (4,267 m) ...	—	230 (370)	Ailerons, total ...	32.20	(3.00)
Max. speed at 15,000ft. (4,572 m) ...	146 (235)	—	Tail plane with elevators ...	33.40	(3.11)
Min. speed near ground	60 (97)	82 (100)	Rudder ...	10.00	(0.93)
	min.	min.	Fin ...	7.18	(0.67)
Climb to 5,000 ft. (1,524 m) ...	4.8	2.3	Note.—The weight data refers to "Jaguar VI.C" engine model only.		
Climb to 15,000 ft. (4,572 m) ...	27.1	7.1	WEIGHTS.		
	ft.	m	Two-seat dual control aerobatic instruction-	lb.	kg.
Service ceiling...	16,700 (5,100)	31,000 (9,450)	Tare weight of aeroplane complete with standard instruments and equipment ...	2,766	(1,255)
Absolute ceiling ...	18,000 (5,500)	32,000 (9,760)	Load:		
DIMENSIONS.			Pilot with parachute ...	190	(86)
	ft.	m	Pupil with parachute ...	190	(86)
Span (top) ...	33 0	(10.06)	Fuel 66 gall. (300 l) ...	508	(231)
Span (bottom) ...	27 3	(8.31)	Oil 6 gall. (27 l) ...	60	(27)
Chord (top) ...	5 0	(1.53)	Signal pistol and cartridges	7	(3)
Chord (bottom) ...	4 3	(1.30)	Total loaded weight for this duty ...	3,721	(1,688)
Height overall ...	11 7	(3.53)			
Length overall ...	27 6	(8.33)			



A head-on view shows where some of the performance comes from—the undercarriage is as clean as possible. (Flight photograph.)

formers, the side panels of the covering being separate detachable units which allow all controls to be examined with a maximum of ease and a minimum of delay. The top decking of sheet aluminium is somewhat unusual, as the cockpits are raised above the top edge of the complete ring-type engine cowling, and from the "hump" thus formed in front of the front cockpit the pilot's two guns project. The main planes and tail units are built up with spars and ribs of high-tensile strip steel, and mass-balanced ailerons are fitted to both the top and bottom planes. The ailerons are balanced aerodynamically on the "Frise" principle.

### The Undercarriage

The undercarriage is one of the structural features which can easily make or mar an aeroplane. That on the 636 undoubtedly contributes very largely to the quite exceptional performance. It consists of two pure cantilever compression legs, both anchored at a central point in the fuselage in a plane level with the top longerons. The upper point of attachment is in the middle of the cross-strut immediately behind the engine bay. The legs are of large-diameter tubing and are stabilised, at the points where they pass the bottom longerons, by stirrup types of fitting; from this point downward and outward the legs are entirely free of supporting structure, and carry at the lower ends Dunlop wheels with medium-pressure tyres and Dunlop pneumatic wheel brakes. The telescopic portion of the leg which takes the landing shocks contains an oleo device and steel coil springs.

In the air, despite the fact that the 636 is a two-seater, there is little apparent difference between it and a single-seater fighter of the highest class. No two pilots will agree on the most desirable characteristics of the controls; on which is the best combination of force required for operation, effectiveness, tendency of the controls to get heavier as the speed increases, and lag in producing the necessary directive force after they have been moved. Those of the 636 bear the unmistakable Avro (or should I say Roy Chadwick?) stamp. They are absolutely positive, delightfully progressive and well balanced. The ailerons particularly, though to my mind a trifle light (an easily-remedied fault—if it be considered a fault) for instructional work, are as near perfect as we are ever likely to see on a machine of this speed until a totally different

method of producing a rolling moment is invented. The elevators and rudder, equally effective for their work, are slightly heavier than the ailerons, but I understand that this point is receiving attention. In any case, as I have already pointed out, controls are so much subject to personal idiosyncracies that it is impossible to criticise them constructively except from one's own point of view.

Aerobically the 636 is grand. The model tried was one of those destined for the Irish Free State Air Force and was powered with a Siddeley "Jaguar" engine from their stock. It did not appear to be giving a superabundant number of "horses," but, nevertheless, there was no doubt that the makers' performance figures could be obtained. With the high-compression "Panther" engine the performance, both aerobically and in speed and climb, would be outstanding for a single-seater, and for a fully-equipped two-seater it is astounding.

There is something almost sacrosanct about the performance of our modern fighting aircraft. One feels diffident even in discussing them and certainly, bearing in mind the performance and manoeuvrability of only a few years ago, the standard of to-day seems almost incapable of improvement in most cases—improvement in control I mean, of course, because given more power from the same unit weight of engine we shall be able to get faster machines whether they are biplanes or monoplanes.

### Roomy Cockpits

The cockpits in the 636 are unusually large and provide ample room for the largest pilots. This is particularly pleasing in prolonged and frequent flying in the inverted position. Nothing hinders the accuracy of aerobatic flying more than a very cramped cockpit; one wants to be snug with everything to hand without being so "tucked in" that one barks knuckles and knees every time one rolls.

Summing up the 636, it is certain that it is entirely admirable for fighter-training and, in fact, it seems to me that so good is it, from the performance point of view, that single-seater fighters may—particularly now that interceptor fighters are virtually dead—fade out altogether and be replaced with two-seaters of this class, not only for training but also for fighting. Two-seater fighters are already being used widely, and if their performance is as good as that of single-seaters there is no excuse for the latter.



# THE R.A.F. EXPANSION

*Supplementary Air Estimate of £5,335,000 for Current Year : Personnel to be Increased by 12,000 : £3,150,000 for "Technical and Warlike Stores"*

**D**ETAILS of the Supplementary Air Estimates needed in connection with the expansion of the Royal Air Force were published last week. The Estimates show a total increase on the original Air Estimates of £5,335,000, and the increase in personnel is one of 12,000, bringing the total up to 45,000. The increases under the different votes of the Estimates are as follows:—

*Vote 1.—Pay, etc., of the R.A.F.:* Pay and personal allowances of officers, £40,000; pay and personal allowances of airmen, £230,000; marriage allowance, £19,000; national insurance schemes—employer's contributions in respect of airmen, £4,000; miscellaneous allowances and payments, £8,000; salaries and wages of civilians, £130,000; recruiting staff and expenses, £18,000. Net increase, Vote 1, £455,000.

*Vote 2.—Quartering, Stores (except Technical), Supplies and Transportation:* Accommodation allowances, £16,000; barrack services, £4,000; fuel and light, £16,000; general stores, £140,000; clothing, £160,000; provisions and animals, £63,000; transportation, £12,000. Net increase, Vote 2, £411,000.

*Vote 3.—Technical and Warlike Stores (including Experiments and Research Services):* Aeroplanes and spares, £2,725,000; inspection services, £50,000; instruments, photographic and miscellaneous stores, £55,000; armament and ammunition, £120,000; electrical stores, £80,000; balloons and hangars, £25,000; mechanical and other transport, £45,000; petrol and oil, £50,000. Net increase, Vote 3, £3,150,000.

*Vote 4.—Works, Buildings, Lands:* Staff for works services, £28,000. *Part 1,* new works, additions and alterations, amounting to £2,500 each and upwards; already authorised, £400,000. *Additional items:* Home: Construction of temporary accommodation, £240,000; provision of aircraft sheds, £150,000; preparation of new aerodrome surfaces, £20,000; Orfordness, additional accommodation, £5,000; purchase of land and buildings, £100,000; rents and reinstatements, £4,500. Net increase, Vote 4, £947,500.

*Vote 5.—Medical Services:* Pay and personal allowances of officers, £6,000; pay and personal allowances of airmen, £1,000; nursing service, £3,000; medical stores and supplies, £5,000; payments to hospitals, £2,000; miscellaneous charges, £1,000. Net increase, Vote 5, £18,000.

## Training and Education

*Vote 6.—Technical Training and Educational Services:* Royal Air Force College, Electrical and Wireless School, School of Store Accounting and Storekeeping, Cranwell—salaries, wages and contingencies, £9,000; School of Technical Training (Apprentices), Halton, salaries, wages and contingencies, £21,000; School of Technical Training (men), Manston: Salaries, wages and contingencies, £7,000; School of Technical Training (men), Henlow: Salaries, wages and contingencies, £25,000; General education services, £4,000. Net increase, Vote 6, £66,000.

*Vote 7.—Auxiliary and Reserve Forces:* Royal Air Force Reserve, pay and personal allowances of regular staff, £1,000; Pay and personal allowances during training, £1,000; Retaining fees and reserve pay, £15,000; Payments to civil companies for training courses, £40,000. Net increase, Vote 7, £57,000.

*Vote 8.—Civil Aviation:* Works, buildings and lands, £500. Net increase £500.

*Vote 9.—Meteorological and Miscellaneous Effective Services:* Telegraph and telephone charges, postage abroad, £20,000; miscellaneous, £5,000; Payments to civil companies for preliminary flying training of regular personnel, £140,000. Net increase, Vote 9, £165,000.

*Vote 10.—Air Ministry:* Salaries, wages, etc., £80,000. Net increase £80,000.

*Vote 11.—Half-pay pensions and other non-effective services, Service and disability retired pay and gratuities of officers and nurses, £15,000. A decrease of £15,000.*

*Revised total of the estimates for the year, 1935.—Vote 1, £5,002,000; Vote 2, £2,044,000; Vote 3, £11,152,000; Vote 4, £4,092,500; Vote 5, £316,000; Vote 6, £488,000; Vote 7, £527,000; Vote 8, £595,500; Vote 9, £546,000; Vote 10, £832,000; Vote 11, £390,000. Total Air Estimates, Gross Total, £29,186,100. Appropriations-in-aid, £3,201,100. Net total, £25,985,000.*

Sir Cunliffe-Lister's explanatory memorandum on the estimates is as follows:—

This estimate provides for the additional personnel and money likely to be required during the current financial year in order to undertake the further scheme for expansion of the Royal Air Force announced in the House of Commons on the 22nd May last.

"This scheme provides for the formation of 71 new squad-

rons for Home Defence by the 31st March, 1937, which will bring the number of squadrons in this country (excluding the Fleet Air Arm) up to a total of 123, with a first-line strength of approximately 1,500 aircraft. It also provides for reserves behind these 1,500 aircraft, and for a corresponding increase in the aircraft for training and other purposes to be held in the ancillary establishments necessary to maintain a first-line force of this strength at the requisite level of efficiency. Of the new squadrons to be formed, three will be on an Auxiliary basis, which will bring the number of non-regular squadrons comprised in the Home Defence force up to a total of 16.

"The programme will entail the entry of some 2,500 pilots and 20,000 other personnel during the next two years, and it will be necessary to enter a substantial proportion of these in the current year. Vote A is accordingly to be increased from 33,000 to 45,000. The anticipated intake of pilots in 1935 is 1,300. To facilitate the recruiting of these large numbers ten new recruiting offices have been opened at the following centres:—Belfast, Birmingham, Cardiff, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Plymouth, Portsmouth.

"The estimate includes provision under Votes 1, 2, 5, 6, 7 and 9 for the pay and maintenance of that proportion of the above personnel which it is hoped to engage this year and for their necessary training.

## Flying Training

"A number of new establishments are to be opened for the flying training of pilots and ground instruction of technical personnel. The number of Service Flying Training Schools, where advanced instruction in flying will be given, is to be raised from 5 to 10, exclusive of Leuchars, which caters primarily for the requirements of the Fleet Air Arm. The *ab initio* training of new pilots, whether for short service on the active list or direct entry into the reserve, will be undertaken at civil Flying Schools. There will for the time being be 13 such schools as compared with the 4 hitherto existing.

"Provision is made under Vote 3, where an additional sum of £3,150,000 is taken, for such cash payments as are likely to mature before March 31st next, as a result of the placing of orders for the large number of aircraft and engines and for the ancillary equipment which will be required for both combatant and training formations. The estimated expenditure in the current year includes progress payments on aircraft and equipment which will not be delivered until the financial year 1936. Provision for the bulk of the cost of the new programme will, of course, fall to be made in this latter year. All arrangements are in train for placing the orders requisite to fulfil the whole programme; aircraft and engines to meet its more immediate requirements are already on order.

## Fifty New Stations

"The revised programme, taken in conjunction with the scheme announced last July, will entail the provision of approximately 50 new stations in all. Sites for many of these new stations have now been selected and money is taken in this estimate for the necessary land purchases in respect of them. It will further be necessary to accelerate the progress of a number of works services already approved by Parliament, to make temporary additions to existing training centres, and to improvise accommodation for new units pending the construction of permanent stations. Provision is also made for placing orders for the steel framework and foundations of 22 aircraft sheds to enable their completion to be effected in time to house aircraft due for delivery in the early part of next year. An increased provision of £947,500 is accordingly taken under Vote 4 for these and other services.

"Account has been taken in the relevant Votes of the cost of the restoration, as from the 1st July, 1935, of the remainder of the emergency abatements made from the remuneration of Ministers, Civil Servants and Industrial Employees, and from the pay, half-pay, pensions, etc., of officers and men of the Royal Air Force and the Royal Air Force Reserves, the total sum required for this service being estimated at £65,000.



"The additional provision under Vote 8 is required for the purpose of the first instalments under agreements with the owners of Gatwick and Gravesend aerodromes. Under these agreements the owners will provide facilities to enable these aerodromes to be used as alternatives to Croydon in conditions of bad visibility on the Continental air route. The agreements will run for a period of fifteen years, the total payments involved being £1,375 a year for the first seven years and £1,050 a year for the remaining eight years.

"The saving anticipated on Vote 11 is due to the retention on the active list of personnel who would otherwise have qualified for retired pay or gratuities.

P. CUNLIFFE-LISTER."

### The Debate

The Supplementary Air Estimates were discussed in committee in the House of Commons on June 22. The Secretary of State for Air, Sir Philip Cunliffe-Lister, explained that although only £5,335,000 was estimated to be required this year, much greater expenditures would be incurred in following years, and he thought these would be something like £35,000,000-£36,000,000. The basis of the British programme, he said, was the statement of the German Government that Germany intended to have an air force equal to that of France. The British first-line strength of 1,500 machines excluded 264 machines serving overseas and 171 machines of the Fleet Air Arm. He expressed gratitude to Lord Weir, who was working as hard as if he were himself Secretary of State. Sir Philip made an interesting reference to the Bristol commercial monoplane ordered by Lord Rothermere. That machine went through its tests at Martlesham, and the experience gained would be of the utmost value to the company in producing military aircraft with the same general characteristics.

On the subject of scrapping obsolescent aircraft, the Secretary of State for Air mentioned that such types as the "Virginia," "Atlas," Fairey G.P. machine and "Wapiti" would at last disappear from the service squadrons. Machines like the "Southampton," "Sidestrand," and "Horsley" would also disappear from the squadrons, although they would be retained for some time as training machines.

Reference has been made previously to the fact that an endeavour is to be made to speed up production by changing somewhat the system of placing orders. On this subject Sir Philip said that they felt justified in placing orders before the prototype had been fully tested. Organisation in time of war and organisation in time of peace, though related, were really entirely distinct. The peace-time organisation demanded an industry sufficient for meeting all the calls of the Government, and after that all the non-Government demands at home and overseas. He quoted the report of the Federal Aviation Commission in the U.S.A. which found that a relatively small industry capable of expanding was preferable to a large industry, the firms of which lived a hand-to-mouth existence. There might, he said, be a risk in an expanded industry that one

might not get the best quality. He hoped there would be closer co-operation between the industry and research. They wanted research in immediate practical problems, and they wanted no less a long-range research.

Turning to the problem of recruiting, the Secretary of State for Air said that the numbers required for the whole programme were 2,500 pilots and 20,000 other personnel. For the present year the requirements were an increase in personnel of 12,000, of whom 1,300 would be pilots. Ten new recruiting offices were opened in Belfast, Birmingham, Cardiff, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Plymouth and Portsmouth. Definite applications had been received from 4,500 pilots. They had accepted 75 in the past month and expected to take them at an increasing rate up to 150 a month during the rest of this year. In ground personnel there had been definite applications from 11,000, and in the last month they had been able to accept 1,330.

The number of service training schools was being increased from five to ten. The 13 civilian schools would be utilised as preparatory schools for the service schools. Something like 50 new stations would have to be established. This would involve 41 aerodromes and various ranges and certain store depots. The siting of these stations must be governed by strategic and meteorological considerations, and broadly they would be located in East Anglia, Lincolnshire, Huntingdonshire, Yorkshire, Bedfordshire, Buckinghamshire, Berkshire, Hampshire, Sussex, Wiltshire, Shropshire, and Forfarshire.

### Contracts

While dealing with the financial terms of contracts, the Secretary of State for Air reminded the House that he had secured the services of Sir Hardman Lever, Mr. Ashley Cooper, Mr. Judd, and Mr. Reeve, of the Associated Equipment Company. Sir Hardman Lever and his colleagues had been working on the contracts question for a number of weeks, and they were satisfied that all the information about costs and so on would be forthcoming voluntarily from the firms. Against those who would like to see Government aircraft factories, Sir Philip argued that during the last war the estimated programme was for 4,000 machines, while the actual output was 693. At Aintree, where fighters were being built, the cost per machine was £5,000, while a similar machine from a private firm cost £1,250. At the Government engine factory at Hayes engine parts were made at a cost of £534,000. The comparable price for similar parts obtained in the trade was only £350,000.

Sir Philip Sassoon, Under Secretary of State for Air, pointed out, in reply to Dr. Addison's pleas for national factories, that the Government expected to complete the programme of expansion in a couple of years, and that, quite apart from the dislocation that would be caused to the industry by removing so many skilled craftsmen, the factories would never be set up in time to carry through the programme under discussion.

## OVERLOADING A "PEGASUS"

IN accordance with the Bristol Company's practice, in collaboration with the Air Ministry, of performing continuous overload running on various types of engines throughout the whole time they are in production, 300 hours such running has recently been completed on a "Pegasus III" engine.

The "Pegasus III" is a medium-supercharged engine which develops a normal output of 665/690 b.h.p. at 2,200 r.p.m. and 3,500 feet, and a maximum permissible output for not more than five minutes of 750/775 b.h.p. at 2,200 r.p.m. The engine in question was maintained continuously at 800 b.h.p. and 2,300 r.p.m. in consecutive ten-hour periods, which, throughout the whole 300 hours, were completed without failure or breakdown. It is intended that this test shall be continued for an indefinite number of periods in order that the maximum experience may be gained.

At the end of each 100 hours running the engine was completely stripped, and on examination, it is stated, it was found that no replacements were needed, either at the conclusion of each test or over the whole period, with the exception of such standard items as washers, split pins and a small percentage of piston rings. Also, in spite of the continuously maintained abnormal output, the average oil consumption for the third 100-hour period was only four pints an hour. During this period also, the engine was fitted with a three-bladed Fairey metal airscrew, which weighs 196lb.

A similar overload test has also been commenced on a "Mercury VI" highly supercharged engine, which is being maintained at 700 b.h.p. and 2,500 r.p.m. The maximum permissible output of this engine for not more than five minutes is 590/620 b.h.p. and 2,400 r.p.m.

Details appeared in January of this year of a similarly successful 300-hour overload test on a "Pegasus II" engine. During the past twelve months over 800 hours of such overload running have been accomplished on this engine with equal success.

### An Important Lawsuit

IN the King's Bench Division last week, before Mr. Justice Lewis, Mrs. Else Charlotte Grein, who is now in America, claimed from Imperial Airways, Ltd., on behalf of herself and her daughter Elli, damages for the loss suffered by the death of her husband, Mr. Louis J. H. Grein. Mr. Grein was killed when the air liner "Apollo," flying between Cologne and Croydon, crashed into a radio mast at Ruyselede, in Belgium, on December 30, 1933, with the loss of the lives of ten people.

The hearing was continued this week, Mr. T. J. O'Connor, K.C., for the plaintiff, alleging that the pilot was negligent. Mr. A. T. Miller, K.C., for the defendants, denied both negligence and liability.

# THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS



THE NEW D.H. "COMET" with which Mr. T. Campbell Black hopes shortly to make three long-distance record flights—to Cape Town and back in five days, England to Hong Kong in five days, and Canada and back in a week-end. The new machine derives a cruising speed of 220 m.p.h. from its two special "Gipsy Sixes" and has a range approaching 3,000 miles. Seen beside it are Mr. Black and Mr. Nicholson, the sponsor of the attempts.

## Aerial Battle Cruisers

The French Navy is said to have ordered three Latécoère flying boats generally similar to the *Lieutenant de Vaisseau Paris*.

## The B.G.A.'s Big Week

Preparations are being made to house forty machines and to entertain nearly a hundred pilots for the British Gliding Association's competitions at Sutton Bank, Yorkshire, from August 24 to September 1.

## Team Tactics

Sixty bombers and thirty fighters left Madrid recently on an instructional flight round Spain. The crews are carrying out exercises in radio transmission, bombing, machine gunnery, photography and navigation. Competition is provided by the allocation of marks for team results.

## Jubilant Boeings

Nineteen Boeing P-26A fighter monoplanes, belonging to the first Pursuit Group of the U.S. Army Air Corps, flew from Selfridge Field, Michigan, to Brantford, Ontario, to participate in the Jubilee celebrations.

## Communal Record-breaking

Four German pilots have broken the new world's gliding record set up about a week ago by Ludwig Hoffman, who flew 305 miles. All four succeeded in landing at Brno, Czechoslovakia, about 310 miles from their starting-point.

## Inventions on Show

The Eleventh International Exhibition of Inventions will be held in the Central Hall, Westminster, from October 2-12. From November 20 to 30, inclusive, the exhibits will be transferred to St. George's Drill Hall, Newcastle-on-Tyne.

## An Overgrown Irvin

A large parachute, capable of lowering a complete aeroplane, has been made for Col. Roscoe Turner by the Irvin Air-chute Company.

## Soviet Uplift

The other day the Soviet dirigible V-1 took a passenger on board without interrupting its flight. It descended to about 300 feet, threw down a specially adapted guide rope and lifted the man safely to its cabin.

## Charles Lindbergh—Doctor

Col. Charles Lindbergh has been helping Dr. Alexis Carrel in the Rockefeller Institute to investigate methods of keeping human organs alive when divorced from the human body. Lindbergh has designed a pump with which the organs of animals have been made to function for long periods almost exactly as if alive. Such experiments are of the greatest value to endocrinologists and may even make the curing of disease a comparatively simple matter.

## A Fireproof Fuel?

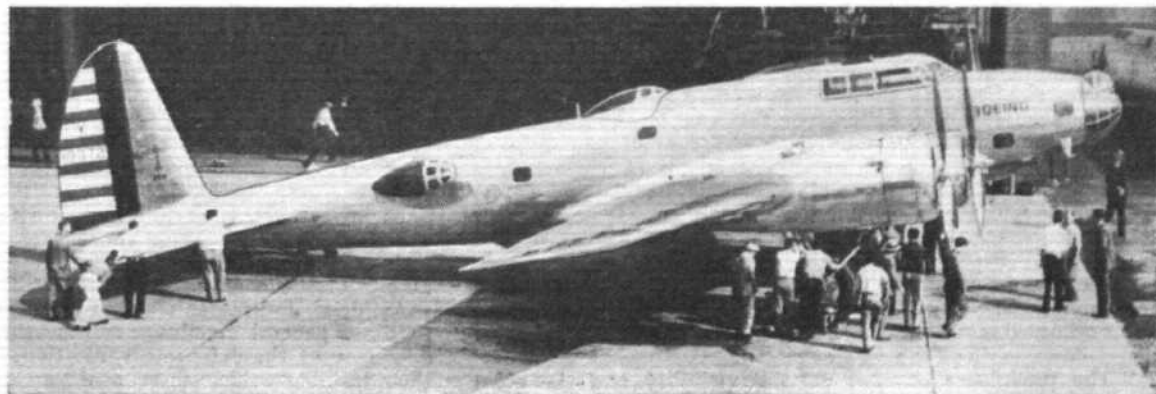
Adolph Prussin, a Prussian-born chemist who has been heard of in this country in connection with a method of solidifying petrol to make it proof against incendiary bullets, has now, with the help of the Guggenheim School of Aeronautics in America, produced a solidified fuel called Solene, into which Clyde Pangborn has fired many incendiary bullets with no serious results. Tests have also been carried out with a small single-cylinder engine, using the exhaust heat to vaporise the Solene.

## Twenty-five Years Ago

(From "Flight" of July 31, 1909)

"The speed was almost incredible," said the chief officer of the coastguard station, who watched M. Blériot's arrival, and certainly the sight of a monoplane coming out of the distance at forty miles an hour would appeal to the imagination even of one whose duty it is to watch all that goes on in the Channel.

**THE BIG BOEING BOMBER:** This photograph shows the new Boeing 299 in its completed state. Its gross weight is said to be 30,000 lb., its bomb load six tons, top speed 250 m.p.h., ceiling 25,000 ft. and range without re-fuelling 2,500 miles. The construction is termed "three-ply all-metal." The engines are four Pratt and Whitney.





## "SHARK" and "TIGER" DEVOUR the HOURS

### A Remarkable Endurance Test

AT the request of the Air Ministry the Blackburn Aeroplane and Motor Co., Ltd., recently carried out intensive flight trials of an Armstrong Siddeley "Tiger VI" engine installed in a Blackburn "Shark" Torpedo Spotter Reconnaissance aeroplane. The standard "Shark" is fitted with a "Tiger IV" engine, and the trials of the "Tiger VI" were required to test the efficiency of the new engine and its installation. Normally, trials of this description are made at a Service Station under ordinary Service routine, but in this case the work was entrusted to the aircraft manufacturers with the object of ascertaining how quickly it could be done under their organisation.

Flying started at the Blackburn aerodrome at Brough on Monday, July 8, at 3.45 a.m., and the hundred hours period was completed on Tuesday, July 16, at 8.15 a.m. On Friday, July 12, flying was interrupted for the day for the more extensive maintenance and inspection required after fifty hours' flying. Originally, the aim of the Blackburn Company was to complete the hundred hours in seven days flying time, and this was very nearly achieved, only 1½ hours remaining to be done on the eighth day. But for bad weather in the

early morning of the sixth day the hundred hours could easily have been completed within the seven days.

As a rule, flying started at approximately 4 a.m. each day and ended at approximately 10 p.m. Every advantage was therefore taken of daylight, and no night flying was done. Flights were generally of 3½ hours' duration, and the time on the ground between flights for fuelling and minor adjustments averaged 35 minutes, the shortest time being 15 minutes. Routine maintenance and inspection was done during the night, between 10 p.m. and 4 a.m.

Four pilots shared the flying time between them. Flt. Lt. A. M. Blake, Blackburn's chief test pilot, made the preliminary and special tests, and the remainder of the flying was done by Flt. Lt. G. M. Morris, who was temporarily engaged for this purpose, and Flt. Lt. H. Bailey and C. A. Ball, instructors of the R.A.F. Reserve Training School operated by North Sea Aerial and General Transport, Ltd. The last two flew in the evenings after their normal working hours.

Both engine and airframe, it is stated, performed entirely satisfactorily during these trials, which were done on Anglo-American fuel to Spec. DTD.230 and Ragosine oil.

### A.E. and M. at Home

LAST Saturday the Aircraft Exchange and Mart were at Home at Aldenham aerodrome. Nearly fifty visiting pilots arrived by air and over two thousand people watched the flying.

### Pilots at Church Service

MR. W. LINDSAY EVERARD, M.P., held his annual invitation gathering of pilots at his own aerodrome at Ratcliffe, near Leicester, last Sunday.

A large number of visitors arrived by air, and after lunch attended a special church service.

### A Jubilee Tour

ONE of the most ambitious demonstration tours ever undertaken by a civil aeroplane is about to begin at Hanworth. The machine in question is a "Jubilee" model S.T.25 (two

Pobjoy "Niagara II" engines). Piloted by Mr. K. G. Seth Smith, who will be accompanied by Mr. S. J. Noel-Brown, secretary of General Aircraft, Ltd., the machine will visit in turn, and give demonstrations at, Shoreham, Portsmouth, Hamble, Ryde, Shanklin, Bournemouth, Plymouth, Newquay, Barnstaple, Cardiff, Liverpool, Blackpool, Isle of Man, Belfast, Campbelltown, Renfrew, Inverness, Aberdeen, Edinburgh, Newcastle, Hull, Skegness, Norwich, Ramsgate, Eastbourne, Redhill, and Brooklands.

### Prophetic

In publishing a photograph of Mrs. Pakenham in *Flight* last week it was stated that she is in charge of the sales department of the Martin-Baker Aircraft Co., Ltd. It has been pointed out to us that this is incorrect, but actually Mrs. Pakenham is joining that firm shortly, although not in the sales department.

## AIR EXERCISES CONCLUDED

(continued from page 121)

were instructed to fly with their navigation lights on over certain parts of the area of operations, but although these lights may be visible at certain angles from 2-3 miles away, they do not afford nearly so good a guide to the defending fighters in the air as a searchlight beam. Concentration of beams on an enemy bomber is clearly visible for many miles and affords a sure indication to the pilot of the fighter of the direction in which to proceed to carry out his attack.

"A part of the searchlight equipment is a sound locator, which gives very accurately the position of an aircraft which may be heard although not seen.

"The attacking bombers had their navigation lights switched off when passing over areas where the Observer Corps were manning their posts. Bombers flying at heights of over 10,000 feet could not be seen from the ground.

### Observer Corps Praised

"In locating enemy bombers by auditory means the Observers' method of plotting the tracks of the bombers by sound proved very effective, not only in indicating the presence of the bomber, but also by giving his direction of movement from point to point with sufficient accuracy to enable the officer commanding the fighters to take action.

"The accuracy of the Observer Corps' information and its rapid communication to the Northland control has been of very great value. The highest praise is due to the members of the Observer Corps who volunteer their services and who are for the most part working men who cannot forgo their daily occupation. In spite of this they have participated in all the night phases. Some groups were working until 4 o'clock in the morning, although on account of raids being held up or cancelled because of fog, they were not kept as fully occupied as could be desired. As a result they were closed down earlier than was expected.

"The prevalence of poor vertical visibility and the great

heights at which both day and night raids were carried out made it obvious that an Observer Corps working both by day and night will be needed. This year the Exercise has been the most realistic one in which the Observer Corps has participated, and has shown up the difficulties which may be expected in carrying out defence against more silent aircraft, flying at even greater altitudes."

**Morning Phase to Conclusion at 1800 hours. Thursday, July 25.**—The day started with slight mist over most of the Eastern area, which gave way to haze as the sun rose higher. Eleven raids were scheduled to start at an early hour, but two were abandoned. Of the remaining nine four were not intercepted, although the others were intercepted ten times. In the afternoon twenty-three raids took place, each consisting of a small formation. Most of these flew at about 10,000 feet, but met with strong resistance, one raid being attacked five times at 12,000 feet.

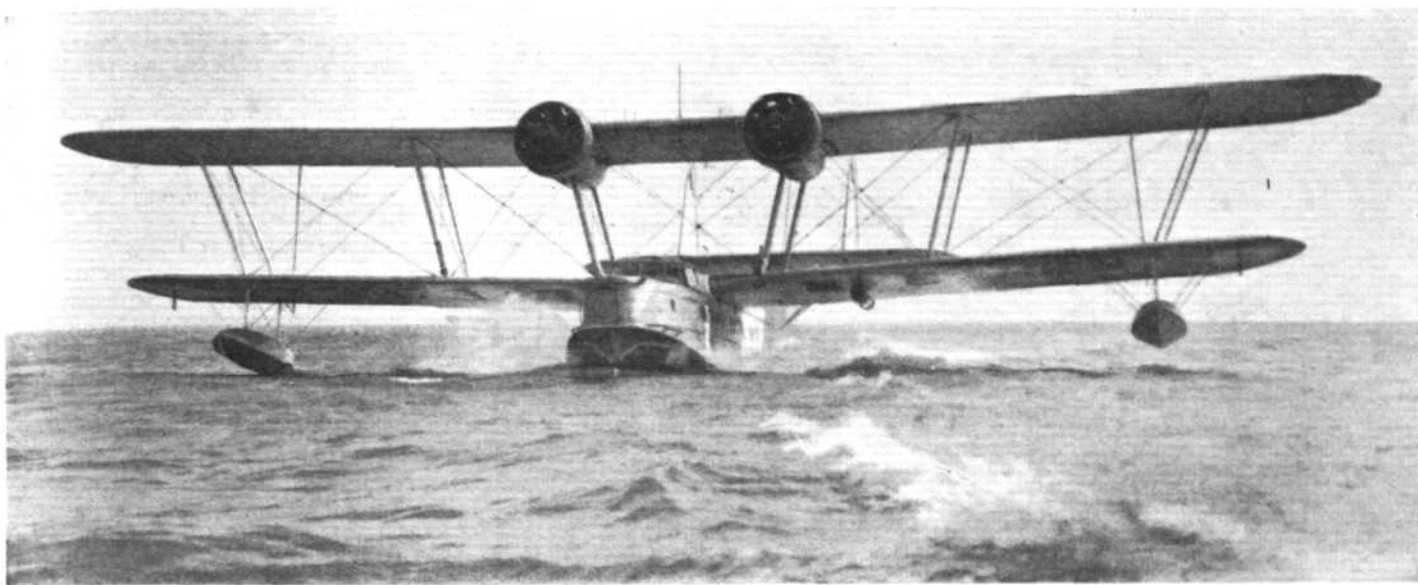
At about 5 o'clock the Directing Staff issued a signal to the effect that hostilities would cease at 6 o'clock.

The A.O.C.-in-C., Air Defence of Great Britain, emphasises that throughout this Air Exercise the effect of anti-aircraft gunfire has been ignored because it cannot be represented in peace manoeuvres.

The fact that several enemy formations apparently penetrated the defences without being intercepted by fighter aircraft does not necessarily indicate a faulty defence organisation; not only would the anti-aircraft guns in their fixed positions have taken their toll, both on the way in and out, but the shell-bursts would in themselves have provided valuable assistance to the defending aircraft in indicating the whereabouts of the enemy.

Artificial limitations such as these make it quite impossible to draw general conclusions from these Exercises as to the adequacy of the defence organisation, but it can be said that their training value has been of immense importance.





## THE "STRANRAER"

*Developed from the Famous "Southampton" and "Scapa," this Vickers-Supermarine Flying Boat Can be Used for Reconnaissance, Bombing, Torpedo Transport, and Flying and Navigational Instruction*

ALMOST since the beginning of practical British aviation the name Supermarine has been associated with the production of flying boats. For several years the boats which emanated from the factory at Woolston, Southampton, were of "composite" construction. That is to say, fittings and a few components were made of metal, the rest of wood. Some very beautiful examples of the boatbuilder's art were to be found in the mahogany hulls of earlier Supermarine flying boats, and when these had to be supplanted by all-metal hulls there were those who lamented the disappearance of a type of construction in which sheer artistry of workmanship found one of its highest expressions. However, sentiment could not be permitted to stand in the way of efficiency, and these "wooden walls" had to give way to modern demands, the plane and spokeshave made way for the "tinbasher's" mallet. The reason? The wooden hulls, no matter how beautiful they looked, nor how perfect their seams, would in the course of time soak up a not inconsiderable quantity of water. In a large boat this soakage might on occasion amount to several hundreds of pounds. Clearly, if this was avoidable, it was not to be tolerated, and when experiments had proved that light metal alloys could be protected against corrosion, the way was open for the introduction of the all-metal flying boat hulls we know to-day.

The Supermarine Aviation Works, like other constructors of flying boats, had their difficulties to overcome. Workmen had to be trained and a new technique had to be evolved. The earliest metal hulls had awkward corners in which water had an unpleasant habit of collecting. Modified forms of construction were introduced to avoid such corners, and in the modern flying boat hull "open" sections, that is to say, members in which no moisture can collect, and in which there is thus no inducement for corrosion to start, have helped to reduce corrosion troubles almost to vanishing point.

The first British flying boats with metal hulls had the planking as well as the frames made of Duralumin, anodically treated to enable it to resist corrosion. Of recent years a light metal sheet known as "Alclad" has become

popular for the planking. This material is in effect a "sandwich" with an inner layer of Duralumin and outer layers of pure aluminium. The aluminium affords the desired resistance to corrosion.

In the Vickers-Supermarine "Stranraer" hull alclad is used both for planking and frames, a form of construction evolved from such successful types as the "Southampton" and "Scapa" flying boats which have helped to make the Supermarine name famous. With the wide practical experience accumulated over a long period of years, the Vickers-Supermarine engineers have been able to incorporate in the "Stranraer" all such features as have been thoroughly proved and tested, and at the same time achieve a very high performance without sacrificing seaworthiness. Very many years ago the Supermarine Aviation Works coined the slogan "A boat that will fly

rather than an aeroplane that will float." In other words, they started with a seaworthy hull and made of it the best aircraft which the knowledge and experience of the day made possible. In the "Stranraer" this seaworthiness has been retained, and it may be pointed out that the machine has been operated in gale conditions with satisfactory results. Moreover, the machine will maintain level flight with either of its two Bristol

"Pegasus" engines out of action, so that safety and reliability may be assumed to have been attained in a very high degree.

The "Stranraer" is a twin-engined biplane flying boat, in which the hull, as already mentioned, is of all-metal construction, and the wings have alclad spars and ribs, with a covering of doped fabric. The two Bristol "Pegasus" engines are placed in nacelles under the upper wing, a position which has the advantage that the airscrews are well clear of spray when the machine is taking off or taxiing. Two alclad petrol tanks, each of 250 gallons capacity, are placed in the centre section of the top plane. The relative positions of engines and tanks are such that direct gravity feed is possible under most conditions, but fuel pumps are used to assist so that during certain manœuvres an adequate supply is ensured.

*"A boat that will fly rather than an Aeroplane that will float" was the slogan coined by the Supermarine Aviation Works many years ago. In the "Stranraer," the latest Vickers-Supermarine Flying Boat, a very high performance has been combined with excellent seaworthiness.*



The "Stranraer" (two Bristol "Pegasus") making an overland journey.

In this cockpit is also the front gunner's station, with gun ring and bomb controls. A hinged watertight door is provided in the nose for bomb sighting.

Adjoining the front cockpit is the pilots' cabin, with dual controls, sliding roof and hinged windscreens. Protection is thus afforded the crew in all weather conditions without impairing the view in any essential direction.

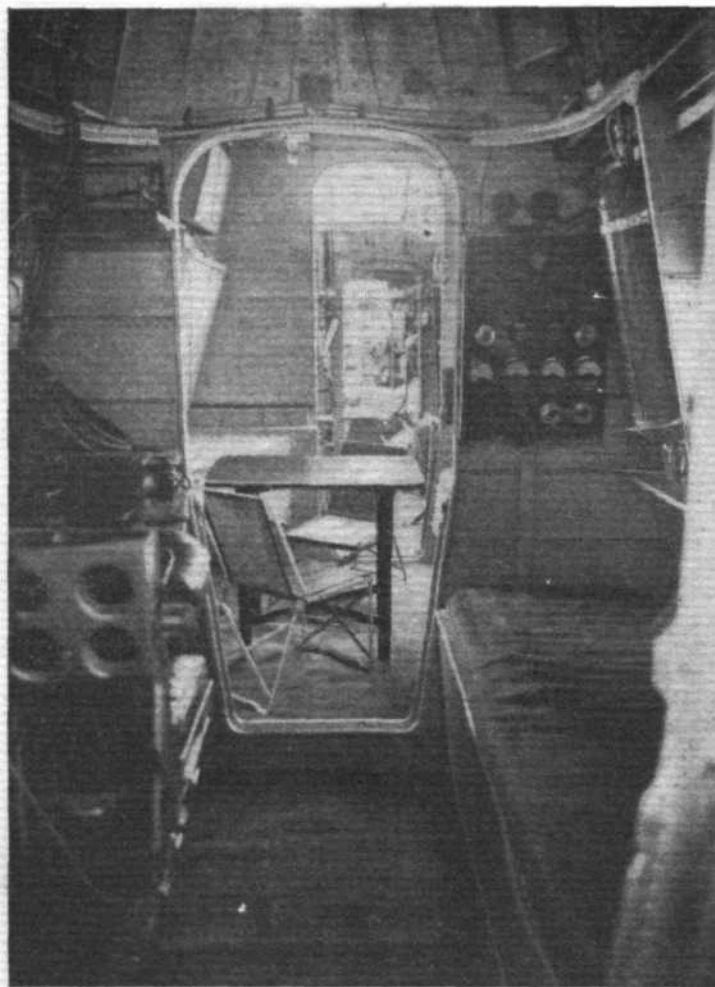
Behind the pilots' cabin is the compartment for the navigator and engineer, and aft of that again the W/T operator's station. A table is provided for the navigator, on which he can spread his charts, etc., and the compartment is well lighted.

Two aft gun stations are provided, one just aft of the rear spar frame, i.e., just behind the wireless operator, and the other in the extreme stern of the hull.

The "Stranraer" is a fairly large aircraft, and as it is intended to operate over considerable ranges ease of control is very important. Great care has been taken in the design of the control surfaces, and trimming "tabs" are fitted both to the elevator and to the two rudders. The rudder "tabs" are used for course-keeping when one engine is pulling more than the other. The extreme case is, of course, one engine completely

In the hull, which is of the two-step type, there is ample accommodation for the crew, even to the extent of enabling the machine to operate as a self-contained unit on a long cruise, for example. In that case, provision can be made for cooking and sleeping on board.

In the extreme bow cockpit is carried the purely marine operating gear, mooring tackle, boat hooks and so forth.



The interior accommodation of the "Stranraer." On the left, is a view looking towards the pilots' cockpit and forward gun station. The navigator and engineer are accommodated in the compartment aft of the pilots' cockpit. On the right, a view looking towards the tail.



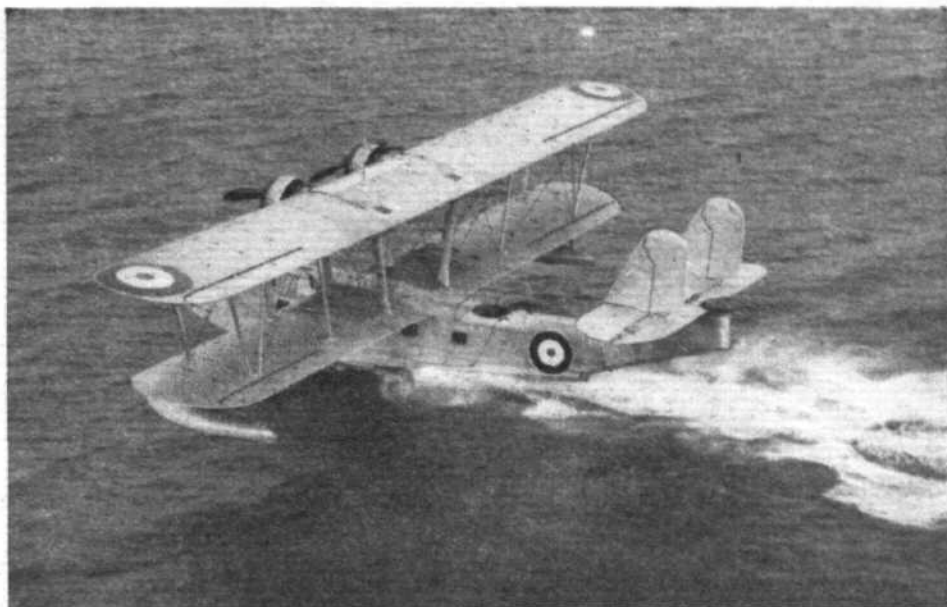
A bird's-eye view of the "Stranraer" alighting on the water.

stopped. By the use of the "tabs," and due to the very powerful rudders, the machine can be turned "against" the running engine.

Of special equipment which the "Stranraer" carries may be mentioned two folding drogues, a collapsible dinghy, an engine ladder, and a platform from which to carry out work on an engine, and a spare airscrew. When the machine is used for extended cruises provision is made for sleeping accommodation, food and water storage, cooking table, etc. A special derrick can be supplied, by means of which an engine can be changed while the aircraft is afloat.

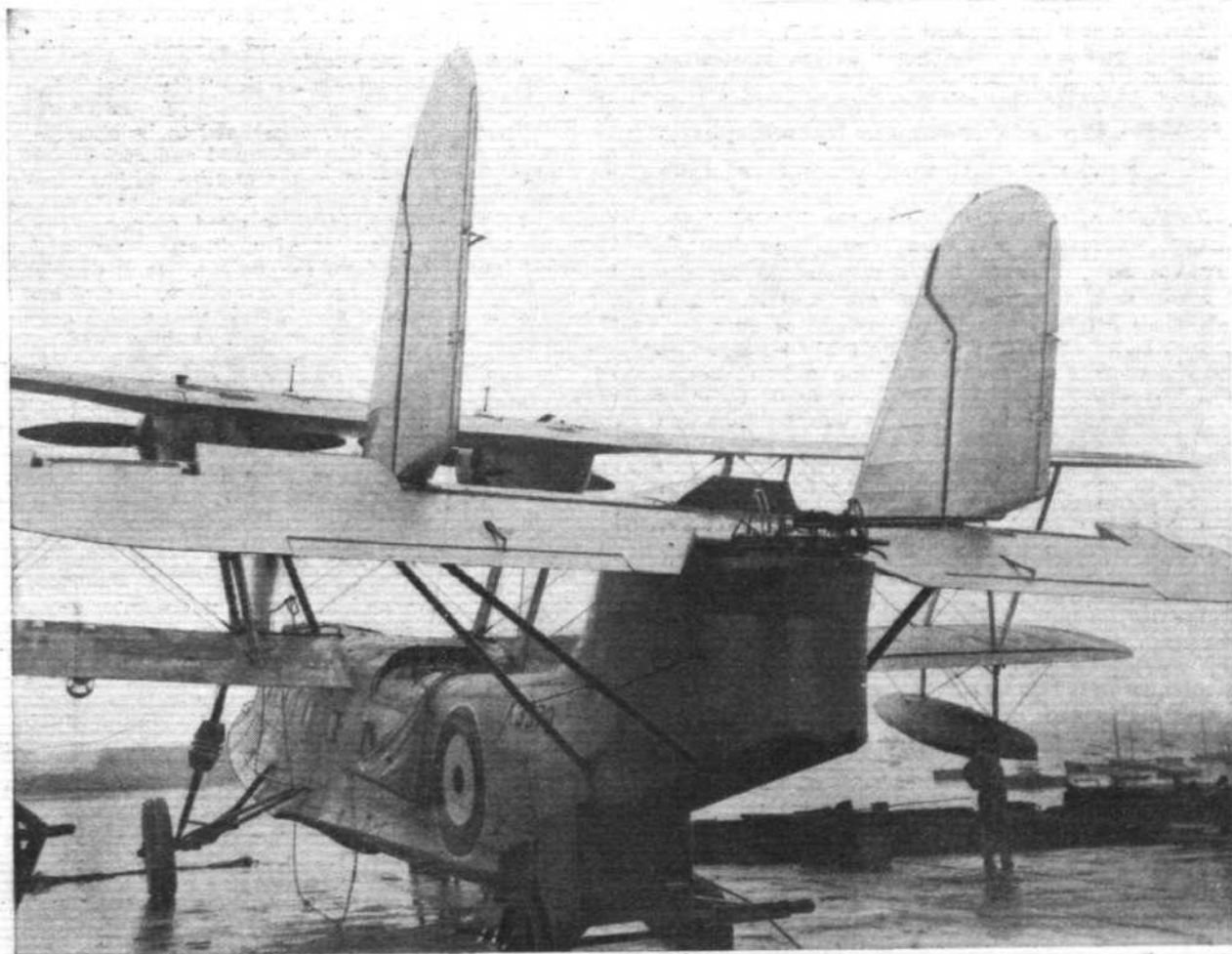
Not carried on board, of course, but intended to be available at any base from which the machine may operate is a launching chassis. This is of non-magnetic material to avoid interference with the compasses, and consists of port and starboard units. Each is attached to the hull at two points and to the wing at one point by quick-release pins. A small auxiliary wheel is fitted to facilitate manoeuvring on the ground.

Owing to the fact that the inter-plane strutting is so arranged that there is a clear space on the roof of the hull and on top of the lower wing roots, it is possible to carry externally some heavy and bulky object such as a torpedo or a spare engine. The extra drag will not improve the performance, but the ability to carry, on occasion, a heavy load in this position may often be found of considerable advantage.



The standard engine type fitted to the "Stranraer" is the Bristol "Pegasus" IIIM, which is a medium supercharged type, but the Pegasus X can be fitted without modification and gives improved performance, although the range is then slightly reduced.

Reference has already been made to the fact that the petrol tanks are carried in the top centre section. Two oil tanks, each of 19.5 gallons capacity, form the leading edge of the top centre section. Oil coolers are incorporated with the tanks. Hand starting and automatic starting by compressed air are provided. Openings are provided in the engine nacelles to give access to all parts likely to need periodic attention.



Stern Defence: The rear gunner's cockpit in the "Stranraer." Note also the control "tabs" on rudders and elevator.



# DIESEL ENGINES and the FIRE RISK

*The Views of Eminent Aircraft and Engine Designers : Some Valuable Opinions*

**F**LIGHT has brought the following letter from Col. J. T. C. Moore-Brabazon, president of the Royal Aeronautical Society, to the notice of a number of leading designers in the aircraft industry, and their comments on this topical subject of fire prevention and the use of heavy-oil engines will, we feel, be of great interest to readers. The tenor of all their letters is in agreement with our leading article on the subject last week. Col. Moore-Brabazon wrote:—

Once again we have to deplore loss of life in a civilian aeroplane due to its load of petrol catching fire.

This time it is of little avail dismissing the accident with the usual justification for petrol engines in aeroplanes, that it matters little whether the dead bodies of the occupants are burned or not.

We know that the shock of landing in this case, as we suspect in others, was not such as instantly to kill every one, far from it, and yet the usual bonfire.

How long are we to tolerate this needless loss of life?

The compression-ignition engine with its nearly non-inflammable Diesel oil is used on trains, on ships, on omnibuses, in fact on every form of transport, except the one on which it should for reasons of safety be made compulsory.

Are we for ever to prostitute the gift of flight by linking it with armaments? Because the petrol engine has a superior performance for military machines, are we to be compelled to use a similar but unsuitable prime mover because the civilian craft is supposed to be a reserve in war?

Once there is a fleet of civilian craft flying on Diesel oil no one will be so mad as to go in anything else.

Could not the Air Ministry help to pioneer a change so long overdue?

A little vision and firmness now (after all, Diesel engines exist to-day) would very soon place British commercial aviation ahead of the world.

The views of designers and other experts appear below. Editorial comment on this subject will be found on p. 117.

## Mr. Fedden's Views

Mr. A. R. Fedden, chief designer to the Bristol Aeroplane Co., Ltd., expresses his views at length, and they are particularly valuable, because he is responsible for the Bristol "Phoenix" compression-ignition engine, which holds the world's height record for this type of unit.

Having spent eight and a-half years on fairly intensive research and experimentation on compression-ignition engines for aircraft, having produced what I believe to be the only successful and practicable all-British compression-ignition engine, having read a paper before one of the branches of the Royal Aeronautical Society on this subject, having written various letters to the Press, having spoken freely on this matter at the recent conference between the R.Ae.S., the A.R.C., and the S.B.A.C., and having had the privilege of a visit to the Bristol Company's engine works from Colonel Moore-Brabazon, in order to review the whole of our compression-ignition development, I am rather surprised and disappointed that, whenever we get one or two fires on civil aircraft, outbursts about the compression-ignition engine ("Why are we lagging behind on the subject?") occur, written, I submit, only too often by authorities who really know better than to do so.

I hate the word "expert," and I do not consider that I am an expert on any subject, but I do feel that I can claim, with some authority, to have some knowledge on this subject based on practical experience, and any statement that may emanate from me must, due to my interest and enthusiasm for the compression-ignition engine for aircraft, be biased in favour of it rather than against it. Nevertheless, I have stated publicly, and also to interested parties who have talked this matter over with me, that I do not see any hope of the compression-ignition engine coming into service for moderate-range air liners unless a considerable reduction in performance and payload is faced by the operating companies.

This statement is not an opinion but is a fact based on practical experience and research. The Bristol Company, after many years of research, produced, two and a-half years ago, a practicable compression-ignition engine for the Air Ministry which was handed over to an independent firm and subjected to extended flight testing, and the official report on this engine shows that starting, slow running, smooth running, maintenance of power at altitude, and general performance, were absolutely satisfactory. This engine had the fullest recognition and support from the British Air Ministry, and every possible encouragement has been given officially for it to be used in new projected aircraft for military and civil purposes. Nevertheless, not a single production order has been obtained for this engine, and I do not see the least chance of any such order being forthcoming. The reason for this is that, in the present state of the art, from a given engine volume and weight, it is only possible to obtain from the four-cycle compression-ignition system a power output approximately 33½ per cent. less than the corresponding petrol engine, but with a lower fuel consumption of 15 per cent. in favour of the compression-ignition engine. This discrepancy does not pay for itself under a range of approximately 1,500 to 1,900 miles according to the type of aircraft, and the lack of specific power output makes it impossible for the modern type of machine, with high wing loading, ever to take off.

## Too Late

This difference in power is due to the introduction of 87-octane fuel, and would not be apparent were we still on fuel of 73-octane. In fact, it has been demonstrated that were it possible to introduce the Bristol "Phoenix" compression-ignition engine into Imperial Airways' "Hannibal" type of aircraft, the annual saving per machine in fuel, based on the price of fuel in England, would be £10,000, and the increase in cruising speed of the machine would be some 2 or 3 m.p.h. as compared with the present "Jupiter" petrol engines using 73-octane fuel.

Although all will agree that the "Hannibal" has been a classic type of civil aircraft, and entirely satisfactory, it is of a vintage which is now considered to be obsolete. It has a small range between the top speed and cruising speed, has a slow cruising speed—under 100 m.p.h.—a light wing-loading, a good take-off with fixed pitch propellers, and engines which cruise at 63 per cent. of their rated output. The modern type of aircraft is an entirely different proposition, and demands much more from its engines. It is unable to take off without controllable-pitch propellers, has a high wing-loading, a high cruising speed, and takes a high output from its engines, cruising at 75 per cent. of their rated output.

These demands imply a more severe load on the engine than in modern military aircraft, and it is quite obvious that, if the difference in performance between the petrol and the compression-ignition engine, of the same bulk and weight, is of the order which I have described above (since the modern air liner demands greater efficiency from its power plant than the corresponding military machine), the compression-ignition engine is quite incapable of meeting these needs.

## Reduced Performance

I am fully aware and in favour of the advantages of the compression-ignition engine, and I am one of those who, as a result of a limited amount of experimental work which can only be finally proved out by full-scale crashes, am a strong believer that fire risk will be very greatly reduced by the use of heavy oil engines, but I am quite sure and quite insistent that, in the present state of the art, it is useless to try to get anyone interested unless they are prepared to drop performance and reduce payload, and go back to the old type of lightly-loaded air liner used successfully in this and other European countries for some years past, but which have been held up to such criticism in the Press, including *Flight*, during the last year or so.

There are other aspects of this matter which I should like to touch upon. The state of affairs which I have described above is mainly due to the introduction of 87-octane fuel. Within the next year or two we shall undoubtedly come on to 100-octane fuel, and, although this brand of fuel will be

expensive, it should be possible to use it in conjunction with a bi-fuel system for civil aircraft, using 100-octane for take-off and a lower grade for cruising. This will be a further blow to the possibilities of using the compression-ignition engine, because 100-octane fuel will push the petrol engine farther ahead than ever as regards power output and fuel consumption.

From time to time we are rather apt to talk loosely about the grade of heavy oil for aircraft. The type of oil which can be used for compression-ignition aero engines is by no means the class of fuel oil used in ships. For aero engines the best grade of fuel oil is required, and it must be realised that there are no facilities for stocking it along our Imperial routes. In fact, I do not see how this is possible until heavy oil is much more universally used for road transport, and the laying down of suitable stocks of heavy oil along our Imperial routes would take a considerable time and cost a very large sum of money.

If we require our civil aircraft to operate over a really long range, then I believe the experimental and research work that has been carried out on the compression-ignition engine during the last decade has been extremely valuable, and that we have just arrived at the time when we could produce an engine which would be quite satisfactory for a range of 3,000 to 4,000 miles or more.

The practical question, however, is: how can such an engine be produced economically? The demand for engines for civil air liners is ridiculously small. The total requirements for Great Britain have not amounted on the average in the past to more than twenty to twenty-five engines per annum. Petrol aero engines on a civil air liner last for 5,000 hours or more.

Since it would take more than £100,000 to develop and tool-up such an engine, who is going to foot the bill for the development and excessive cost for such a negligible and uneconomical production per annum?

I am afraid that if we cut out loose thinking and pious hopes the case is absolutely as plain as a pikestaff. In short, the position is as follows:—

### Position of Diesel Engine Hopeless

If the demand for the modern high-speed air liner is to continue (and because the most efficient aeroplane we know to-day is such a poor load carrier), then I do not think we can possibly expect the civil air line operators to attempt to use the compression-ignition engine of their own volition, and, what is more, the greater demand for high cruising speed (and we are constantly hearing of much higher speeds being talked of) then the more efficient the engines will have to be, the higher the cruising speed from a given volume, the more closed in and hotter the exhaust system will be, and the more likelihood there will be of fire in the event of a crash.

I am quite sure that satisfactory, safe, and reliable compression-ignition aero engines can be made, and that with such a power plant the fire risk would be enormously reduced, but, seeing the negligible demand that there will be for some years to come for such a type of engine for civil use, and the tremendous urge and impetus to the "opposite number" from the military side—the already strong and lusty petrol engine, which is just about to have another step up by the introduction of 100-octane fuel—the position of the compression-ignition engine is, in my opinion, quite hopeless unless preference be given to it by official action.

To face up to the big financial expenditure necessary for the development of such a special engine no aero engine maker or civil aircraft operator can be expected to foot the bill, neither can he be expected to pay for the laying down of suitable stocks of fuel oil, and, therefore, I suggest that the only solution is official action to meet such expenditures.

Personally, I doubt whether such official action would be a wise procedure. It would certainly go a long way towards the elimination of fire risk on our civil aircraft, but it would seriously handicap them in competition with foreign air lines, who, I have no doubt, will stick to petrol engines and high performance, and face the fire risk.

It seems to me that it is always dangerous to legislate along such lines, and if the public require this high speed on civil aircraft they will have to face the consequences.

In my opinion the only logical solution is to develop our aircraft so that they can regularly, and with safety, cruise at, say, 25,000 feet. We shall then avoid the two great dangers which are more prone than any others to cause the type of crash from which fires ensue, *viz.*, getting into a bad storm, or flying into the side of a hill.

To sum up, it is clearly impossible, unnatural, and uneconomical for the compression-ignition engine to be introduced, and this state of affairs cannot be changed unless someone is prepared to foot a very considerable bill.

This is the opinion of Mr. Roy Chadwick, chief designer to A. V. Roe and Co., Ltd.:—

From the fire risk point of view it is obvious that the heavy oil engine would have the advantage over the petrol engine, and knowing this, one would imagine that aircraft operators would demand this type of engine. This, however, is not the case, as I cannot recall an instance, out of innumerable enquiries, where engines designed to run on heavy fuel oil have been specified.

Up to the present time there are very few such engines available, and the operating experience with them, at all events in this country, is negligible. Perhaps this is the reason they are not called for.

Theoretically, the Diesel engine is more economical in fuel consumption, but on the other hand, its weight per b.h.p. is greater, and for this reason it is more suited to machines designed for very long range. Most commercial machines are, of course, designed for maximum payload, and this is another reason why the Diesel-type engine is not specified, as its extra weight would reduce the payload on the flight stages usually undertaken by commercial aircraft.

I cannot say whether the Diesel-type engine is likely to be more economical from the point of view of running costs and maintenance. Theoretically it should be, and no doubt when this type of engine has been fully developed it will be so, and will be used extensively.

### Opposed-Piston Two-Stroke

Four points are made by Major Frank B. Halford, designer of the Napier "Rapier" and "Dagger" engines. The makers, incidentally, are responsible for the "Culverin" compression-ignition engine.

(1) I firmly believe that heavy-oil engines are desirable and that they would lessen risk of fire.

(2) I believe that in the long run they will prove more economical, both on running costs and maintenance, provided that the cost of heavy oil and any taxation thereon is not unduly increased.

(3) In the present state of the art I cannot see the immediate use of the heavy-oil engine in aircraft, whether for military or civil purposes, except for machines of really long range, *i.e.*, in excess of fifteen hours.

(4) I believe the two-stroke engine, with end-to-end scavenging, will be the most probable solution to the problem.

### Economy and Maintenance

Mr. H. E. Broadsmith, technical director, Saunders-Roe, Ltd., gives his opinion as follows:—

I agree that heavy-oil engines are desirable—the reference to "heavy," of course, being applicable to the fuel only.

Risk of fire in a crash would be considerably reduced, as, on account of the higher expansion ratio, and weaker mixture employed, the exhaust gases, and consequently the exhaust manifolds, are much cooler than is the case with the petrol engine, and therefore less likely to ignite any-oil which may come into contact with the exhaust manifolds after a crash. Such burning as might occur would be relatively slow, and there would be no petrol vapour to ignite.

As regards economy in running, until the specific weight is reduced to some figure comparable with that of the petrol engine, economical use is restricted to long-range aircraft, of sufficient range to allow the lower fuel consumption to offset the increased engine weight. This range is from two to three times the average range of British civil aircraft.

As regards maintenance costs, top overhauls should be cheaper, and the exhaust valves, on account of the cooler gas, should have a longer life. Complete overhauls, however, would probably be more expensive, on account of the increased wear on the cylinders, piston rings and bearings.

Vibration troubles may be the cause of additional maintenance to the engine mountings and surrounding structure. These latter remarks are, however, based upon rather limited knowledge of the present state of C.I. engine development.

To anticipate early development of the C.I. engine, to the stage where it can be available for general use, is unduly optimistic.

When one considers the wide range of petrol engines used, from 100 h.p. upwards, in civil aircraft operating to-day, it



will be appreciated that it will be some considerable time before the C.I. engine can be available in the necessary sizes and quantities to replace them.

Present C.I. engine development appears to be in the direction of higher h.p. than is generally required, *i.e.*, from approximately 600 h.p. upwards. (One has heard nothing more of what appeared to be a most promising engine—from the aircraft constructors' point of view—the 240 h.p. American Packard radial, produced about 1930.)

During what must be a long period of development, before C.I. engines are available, the fire risk must be reduced by other means, such as: (a) The use of tanks of the "non burstable" type, of which one or two examples exist, although perhaps in a comparatively undeveloped state; (b) More favourable location of the tanks in the aircraft structure. (In recent civil designs, it has been convenient to mount the petrol tanks in a portion of the fairing which encloses the engine and undercarriage, and in such a position they are vulnerable in even a minor crash.)

### Heavy-oil Inflammability

Mr. C. C. Walker, director of the De Havilland Aircraft Co., Ltd., writes as follows:—

The development of heavy-oil aero engines has been delayed by the rapid development in the petrol engine which is taking place concurrently with the availability of better fuels.

Safety in air transport depends on many factors, and is contributed to very considerably by the use of engines which are the result of steady and continuous evolution under intensive use.

It is, therefore, very difficult to estimate the effect on total safety of substituting too quickly an aero engine relatively less developed than the existing petrol engine. It might possibly be that one risk would be reduced and others increased, and it must be remembered that under some conditions of contact with hot metal heavy oil ignites when petrol does not.

It is certainly very desirable that the use of heavy-oil aero engines should be encouraged and experience accumulated. In the meantime the causes of accidents should have at least as much attention as their effects.

So far as the economic side of the question is concerned, it is generally agreed that the total weight of engine-cum-fuel becomes lower for the heavy-oil engine only for flights of very long duration. It is impossible to say anything about the cost of a fuel which might be taxed at any moment. The greatest deterrent is not economic in character; it is the lack of development experience.

### Put in a Nutshell

Mr. Handley Page, the products of whose company have so well served Imperial Airways, sums up the matter in the following words:—

As I am informed that the use of heavy oil engines in aircraft would result in (1) a very much heavier power plant for the same power, (2) increased operating costs due to the special distribution of the high-grade oil which would be required, the question is whether transport companies are willing to cut down their paying load, the public to pay more for their fares, and governments to allow larger subsidies, and so do away with the risk of fire.

Mr. H. O. Short, of the pioneer firm of Short Bros., Ltd., puts forward the following views:—

The chief difficulty encountered and not yet overcome in the heavy-oil engine for aircraft is the low power available for take-off. A "sticky" take-off from most of the available aerodromes may involve greater risks than the risk of fire from petrol, and until this difficulty is overcome aircraft operators will not adopt heavy-oil engines.

By persistent effort this difficulty will, no doubt, be overcome. The Government can help by insisting on and supporting financially continued development with the heavy-oil engine and also by instituting research into fire prevention in crashes where petrol engines are used.

## THE R.N. AND R.E.'S AT HOME

LAST Saturday the Royal Naval Flying Club and the Royal Engineers' Flying Club held an At Home at West Malling aerodrome, where both have flying facilities for members. These two clubs have much in common. The R.N. Club was started in 1931 for the purpose of providing, by arrangement with existing concerns, flying facilities for its members wherever such facilities were demanded. It does not run its own machines, as its endeavour is to see that naval officers have the opportunity of flying wherever they may be. The R.E. Club does much the same thing for that part of the Army which it represents.

Saturday's programme included a flying display. This was sufficiently long to interest the members, but was not drawn out—as is so often the case—long enough to bore them. There was a landing competition, which was won by Mr. E. C. Myers, of the R.E., and a bomb-dropping competition, won by Lt. T. M. Wintour, R.N. Among those machines which gave flying demonstrations was a Miles "Hawk," flown by Mr. Lawn, one of the instructors from Reading, who gave a most polished show, including prolonged inverted glides, and who finished up by remembering—a point which many pilots forget—that a low flight flat-out down wind is the best

way to demonstrate a machine's speed; his showmanship and placing of the aeroplane throughout his display was altogether excellent.

Then Mr. Piper flew the Short "Scion" round, naturally without aerobating it to any great extent. His part was more profitably played by taking people up for flights later in the afternoon.

Mr. Lucas, a Hawker test pilot, then roared about in a "Hart." "Roar" is the word. His aerobatics are well known at these displays and were naturally watched by the naval officers (among whom were many from the Admiralty) with great interest, because Hawker machines form a large proportion of those in the Fleet Air Arm.

Mr. Richardson took full advantage of the wind and floated about in an Autogiro in the manner only possible with rotating-wing aircraft. His vertical descents were vertical, and his slow flying was slower than walking pace.

Finally, Mr. Seth Smith showed many passengers just how comfortable is the new Monospar S.T.25, or Jubilee model.

Mrs. Kennedy-Purvis, wife of Rear Admiral C. E. Kennedy-Purvis, the chairman of the R.N. Flying Club, presented the prizes.

## ROYAL AERO CLUB OFFICIAL NOTICES

THE Aero Club of Germany has notified the Royal Aero Club that the following aerodromes are closed to general air traffic until October 31, 1935:—Halle/Nietleben, Braunschweig, Dessau, Kottbus, Fürth, Lubeck, München/Schleissheim, Friedrichshafen, Hildesheim, Weimar/Nord, Schwerin/Würzburg, Magdeburg, Frankfurt a/O, Wangerrooge.

Sir Harold Gengoult-Smith (who was Lord Mayor of Melbourne at the time of the England-Australia race) accompanied by the Hon. Richard Linton, Agent-General for Victoria, attended at the Royal Aero Club on Wednesday, July 24, and presented to the committee of the Club a replica of the gold speed trophy awarded to the winner of the race.

The presentation was made on behalf of the Melbourne Cen-

tenary Committee as a mark of appreciation of the work which the Royal Aero Club undertook in the organisation of the race.

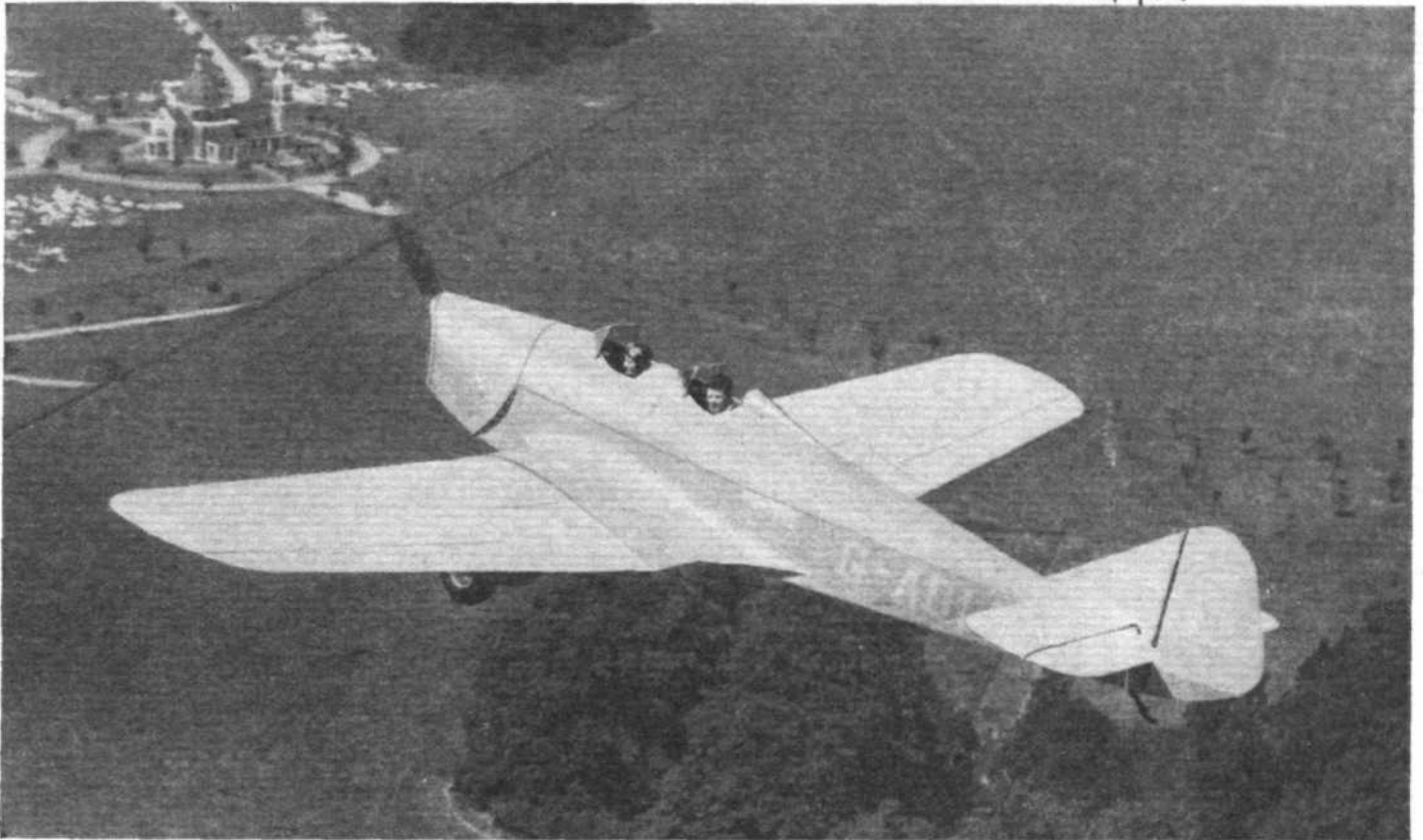
### "Flight" Index and Binding

THE index to Volume XXVII of *Flight*, covering the issues from January to June, 1935, is now ready, price 6d., or by post 7d. With a binding case in blue cloth the price is 4s. 4d. by post. The charge for supplying the case and index and binding the copies is 8s., plus 9d. for return carriage. Communications should be addressed to the publishers of *Flight*, Dorset House, Stamford Street, London, S.E.1.

# NEW MODELS from READING

*Flying the De Luxe "Hawk Major" and the Latest "Falcon"*

14987



Mrs. Miles and Mr. F. G. Miles flying the new De Luxe "Hawk Major" near Reading. (Flight photograph.)

**M**R. C. O. POWIS, Mrs. Miles and Mr. F. G. Miles, of Reading, are a triumvirate prolific in the production of new and efficient aeroplanes.

The De Luxe "Hawk Major," which is the private owner's version of the "Hawk Trainer," is really well finished inside and out. The cockpits are upholstered in a style which is both elegant and practical, the seats are unusually comfortable, and, since they have been widened, they now provide ample room for the largest of pilots. My impression, immediately I sat in the cockpit, was that here was the nearest approach to cabin comfort that I had yet seen in an open machine. There is no doubt that there is still a large demand for an open machine, provided that the comfort is such as to obviate the necessity for an undue amount of extra clothing and pedal encumbrances of the kind which one dons when going up in an aeroplane-of-war.

Despite the bumpy conditions when I recently made a short flying trial of this new model, I was favourably impressed by the pre-eminently "private-owner type" of controls. By which I mean that, although they were perfectly adequate even when landing in the somewhat difficult conditions of that day, they were not so sensitive or "touchy" as to give the feeling that they would be likely to get the machine into dangerous attitudes if used in a clumsy manner. Actually, as with all "Hawks," this new model does not readily get into dangerous attitudes as a result of slovenly flying. The stall I found most polite! A gentle squash at an air speed below the reading of the "clock" was all that would happen if the machine were stalled fairly slowly, and she could be made to descend with the tail-trim right back, and with hands and feet off, in a fully stalled condition. A swaying motion naturally built up after a while and probably a spin would have ultimately resulted, but a touch on the ailerons righted her at once. There was no tendency to drop a wing sharply at the moment of stall.

Landing presents no difficulty at all. Flaps-up, she glides like most low-wing monoplanes with the nose rather high, but lowered flaps alter the attitude, so that the fuselage is practically horizontal, giving the pilot a clear outlook over

the nose, and the angle of glide is steepened very satisfyingly. The flaps are operated by the Miles type of hydraulic pump, which gives rapid and easy control so that an approach can be prolonged or cut short without necessitating the use of the engine.

Externally the finish is car-like and fully up to the standard of those much-vaunted American manufacturers.

So much for the new "Hawk." I have dealt only with certain of its features which struck me as most worthy of note, because all its other characteristics are well known and have been described by me when dealing with previous models.

The same evening I was able to make a flight in the first of a new series of Miles "Falcons." This type, which readers will remember is virtually a three-seater cabin machine of "Hawk" parentage, has now been fitted with a "Gipsy Six" engine, and in this guise is being produced as a De Luxe model replete with every refinement. The performance is just what one would expect. The take-off is better than when the "Gipsy Major" was used—an obvious remark, perhaps, but I have heard it said that the extra weight of this engine would more than counteract the increase of horse-power, so that the take-off would remain the same; this is certainly not the case. The speed has gone up, but to what extent I was unable to ascertain, because this machine was still in an experimental state. I imagine that a speed of 150 m.p.h. should be well within its powers, but I shall be able to give the full performance figures later when they have been checked.

Internally, this new "Falcon" is superb. The comfort of the three seats is far better than that of many motor cars of to-day and the sound-proofing is quite effective. In the air the flying characteristics of the class do not appear to have been altered except in so far as the performance has been enhanced. It is still possible to float about with the A.S.I. needle "right off the clock," without feeling that anything vicious is going to happen. The controls are naturally slightly heavier at speed than on the other models, but not so much so that they would make a long journey tiring. In the taxi class and private-owner class this "Falcon" should find a ready sale.

C. N. C.

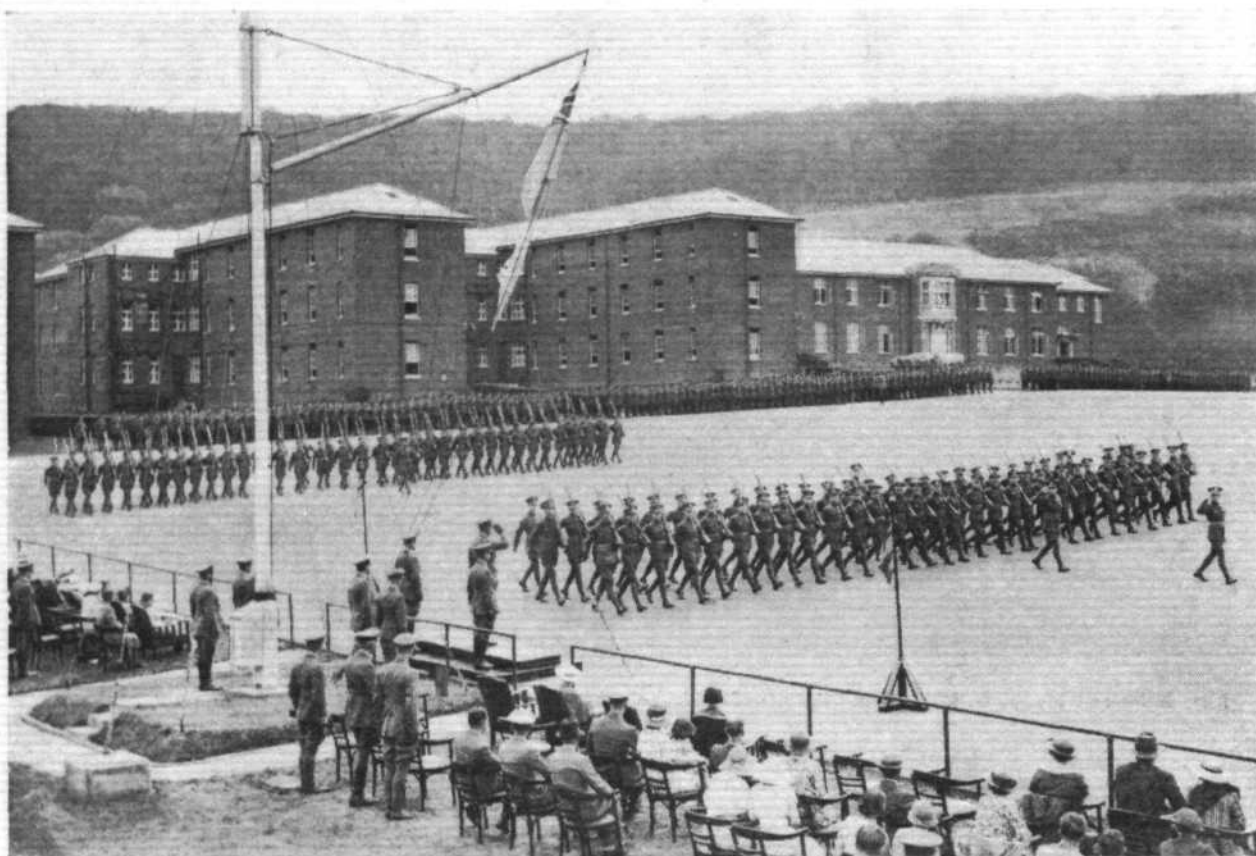


# THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS



AIR MINISTRY ANNOUNCEMENTS



THE HALTON INSPECTION was carried out by Air Vice-Marshals C. L. Courtney, C.B., C.B.E., D.S.O., on July 23. Here he is shown taking the salute at the march past of the Aircraft Apprentices.

## RECRUITING DEPOTS

The following are added to the list of recruiting depots: Portsmouth.—10, Pearl Buildings, Commercial Road; Plymouth.—12, Buckland Terrace, Millbay Road.

## FORMATION OF STORAGE UNITS

On the completion of the move of the aircraft storage portion of the Royal Air Force Storage Section, Kenley, to Waddington, which will begin on December 2, 1935, the Royal Air Force Storage Section, Kenley, will cease to exist as such and will reform as No. 2 Mechanical Transport Storage Unit, Kenley. Storage accommodation will be available at Kenley for approximately 400 vehicles.

No. 3 Aircraft Storage Unit will begin to form at Sealand on December 2, 1935.

## FLEET AIR ARM

The Board of Admiralty has decided to replace the existing rating of telegraphist air gunner by a non-substantive rating of air gunner open to the seaman, signal, and telegraphist branches. A new higher non-substantive rating of observer's mate will also be introduced. The Board intends that the observer's mate shall be employed (other than as pilot) on those air duties which:—

1. Demand a higher standard of efficiency and training than is at present attained by telegraphist air gunners, and
  2. Are in certain cases now carried out by observer officers, and which it is anticipated will prove to be within the capacity of ratings with a suitable training.
- Observer's mates will ultimately be selected from air gunners who are qualified. Until, however, there are available numbers of air gunners with sufficient air experience, they will be selected from the existing telegraphist air gunners.

## TRANSFER OF PARACHUTE COURSE (OFFICERS) FROM HENLOW TO MANSTON

The Parachute Course for officers was transferred from the Home Aircraft Depot, Henlow, to No. 3 School of Technical Training (Men), Manston, on July 1, 1935.

## HALTON

The following is an extract from the report by Air Comdre. J. T. Babington, C.B.E., Air Officer Commanding, Royal Air Force, Halton, upon the occasion of the Passing-Out of the 26th Entry of Aircraft Apprentices:—

"Of the 232 boys originally attested, 70 were posted to the Electrical and Wireless School, Cranwell, for training as Electricians and Wireless Operator Mechanics. Casualties from sickness and other causes, during the three years amounted to 24, while one apprentice was transferred from a senior entry, leaving 143 now to pass into the Service. As a result of the final examinations, 14 have been classified as Leading Aircraftmen, 103 as Aircraftmen 1st Class, and 23 as Aircraftmen 2nd Class. No apprentice failed to qualify.

## PRIZE WINNERS.

1st Grand Aggregate:—Sgt./App. James Anderson Pitcairn-Hill. 2nd Grand Aggregate:—Sgt./App. Robert Thomas Frogley. 3rd Grand Aggregate:—L.A.A. Alfred Stanley Knowles. Educational Subjects:—Sgt./App. R. T. Frogley. 1st Fitter II:—Sgt./App. J. A. Pitcairn-Hill. Elliott Memorial Prize:—Sgt./App. J. A. Pitcairn-Hill, Sgt./App. Peter Guy Wykeham-Barnes, tie. Lord Wakefield Scholarship:—Aircraft Apprentice J. A. Pitcairn-Hill.

## CADETSHIPS.

Aircraft Apprentice P. A. N. Cox, Aircraft Apprentice P. G. Wykeham-Barnes, Aircraft Apprentice J. A. Pitcairn-Hill, Aircraft Apprentice R. T. Frogley.

## CRANWELL

The following extracts are made from the report of the Commandant of the R.A.F. College, Cranwell, at the recent passing out inspection of Flight Cadets:—

There are 114 Flight Cadets at the College. Since the formation of the College, including the term now passing out, 757 Flight Cadets have graduated.

Twenty-nine cadets have finished their flying training course at the Royal Air Force College this term. Ten have been selected for Fighter squadrons, four for Day Bomber squadrons, three for Night Bomber squadrons, four for Army Co-operation squadrons, four for Flying Boat squadrons, and two for Torpedo Bomber squadrons. Cadets passing out have averaged 66 hr. 30 min. dual and solo flying on service type aircraft, and 155 hr. 10 min. on all types during the course. The cadets now passing out have completed an average of over seven cross-country flights. All IV Term cadets have completed an instrument flying course, with an average of 9 hr. 30 min. flying per cadet.

No cadet has been seriously injured. There have been two accidents which wrecked the aeroplanes concerned. In one a cadet flying solo failed to recover from a voluntary spin. He abandoned the aeroplane and descended by parachute, suffering minor abrasions. In the other a cadet flying solo misjudged his approach to the aerodrome and flew the aeroplane into a stone wall. He sustained only minor injuries.

Cadets of the IV Term have been equipped, as an experiment, with blue shirts and the new type of hat. Both have proved popular and successful.

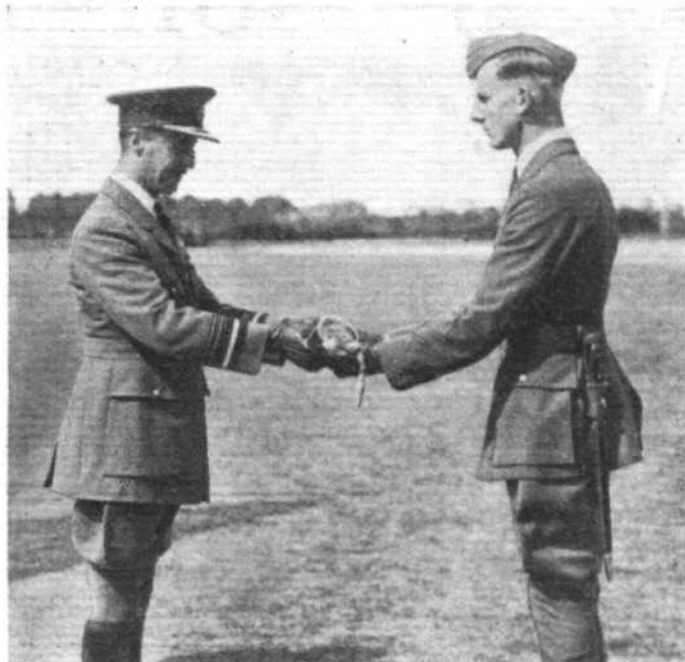
Anti-gas training for cadets was started in the Spring session. All cadets have completed the course, including passing through the gas chamber, and have been equipped with gas masks. This training is now included in the syllabus.

## Awards

His Majesty the King's Medal, presented to the Flight Cadet who obtains the highest aggregate of marks in all subjects in the final order of merit following the passing-out examination, has been awarded to Flight A/Sgt. Arthur John Mason.

The Sword of Honour, presented to the best all-round Flight Cadet in the Senior Term, has been awarded to Flight Cadet Under-Officer Henry Everard Crichton Boxer.

The Air Ministry Prize, awarded to the Flight Cadet in the Senior Term obtaining the highest marks in English and History, has been won by Flight Cadet Anthony William John Clark. The Air Ministry Prize awarded to the Flight Cadet in the Senior Term obtaining the highest marks in Aeronautical Engineering has been won by Flight Cadet A/Sgt. Arthur John Mason. The Abdy Gerrard Fellowes Memorial Prize, for the Flight Cadet obtaining the



THE SWORD OF HONOUR being presented by Air Marshal Sir Cyril L. Newall, K.C.B., C.M.G., C.B.E., A.M., to Flight Cadet Under-Officer H. E. C. Boxer, at the passing out inspection of the R.A.F. College, Cranwell. Note the new pattern of cap worn by the flight cadet.

highest marks in Mathematics and Science, has been awarded to Flight Cadet A/Sgt. Arthur John Mason. The J. A. Chance Memorial Prize, for the Flight Cadet in the Senior Term obtaining the highest marks in Service Subjects, has been awarded to Flight Cadet A/Sgt. Arthur John Mason. The R. M. Groves Memorial Prize, for the best all-round pilot in the Senior Term, has been awarded to Flight Cadet A/Sgt. Peter Theodore Philpott.

## ROYAL AIR FORCE GAZETTE

London Gazette, July 23, 1935

## General Duties Branch

The following Flying Officers are promoted to the rank of Flight Lieutenant:—P. Heath (June 14); R. A. McMurtrie (June 27).

F/O. R. S. Darbishire is promoted to the rank of Flight Lieutenant (June 6), and with seniority of August 1, 1934.

P/O. W. G. Devas is promoted to the rank of Flying Officer (April 2).

The following Pilot Officers are promoted to the rank of Flying Officer (June 16):—C. C. Francis, G. Thripp, J. Thompson.

Air Marshal Sir John Miles Steel, K.C.B., K.B.E., C.M.G., is placed on the half-pay list, scale A, from July 21 to July 31, inclusive.

Wing Comdr. V. Gaskell-Blackburn, D.S.C., A.F.C., is restored to full pay from half-pay (July 14).

Lt. Comdr. Charles A. Kingsley-Rowe, R.N., Flying Officer R.A.F., ceases to be attached to the R.A.F. on return to Naval duty (June 21).

Sqn. Ldr. J. H. Green is placed on the retired list (July 20).

Acting Pilot Officer on probation G. Packe, relinquishes his short service commission on account of ill-health (July 22).

The short service commission of Acting Pilot Officer on probation F. E. Mack is terminated on cessation of duty (July 15).

## Medical Branch

Flt. Lt. (Quartermaster) W. Gamblen is promoted to the rank of Squadron Leader (July 1).

## Dental Branch

H. M. G. Williams, L.D.S., is granted a non-permanent commission as a Flying Officer with effect from and with seniority of July 1.

## ROYAL AIR FORCE INTELLIGENCE

**Appointments.**—The following appointments in the Royal Air Force are notified:—

## General Duties Branch

**Squadron Leaders.**—P. C. Wood, to Special Duty List, 10.6.35; on appointment as Assistant Air Attaché, Santiago. E. I. Bussell, to D. of T., Dept. of A.M.P., Air Ministry, 17.7.35.

**Flight Lieutenant.**—R. L. Ragg, A.F.C., to Marine Aircraft Experimental Establishment, Felixstowe, 10.7.35.

## Chaplains Branch

The Rev. G. A. Davies, B.A., is promoted to the relative rank of Group Captain (June 28).

## ROYAL AIR FORCE RESERVE

## Reserve of Air Force Officers

## General Duties Branch

The following Pilot Officers on probation are confirmed in rank on the dates stated:—M. R. Macarthur (June 5); F. H. Vivian (July 1); J. B. Seager (July 9); C. S. Thomas (July 9).

The following Flight Lieutenants are transferred from Class A to Class C on the dates stated:—M. J. Du Cray (July 15); C. C. Clark (Lt., R.A.R.O.) (July 23).

## Medical Branch

Flt. Lt. P. J. Nyhan, M.B., B.Ch., relinquishes his commission on completion of service (May 2).

## SPECIAL RESERVE

## General Duties Branch

J. B. Parnall is granted a commission as Pilot Officer on probation (July 11).

## AUXILIARY AIR FORCE

## General Duties Branch

No. 604 (COUNTY OF MIDDLESEX) (FIGHTER) SQUADRON.—Flt. Lt. I. G. Statham relinquishes his commission on completion of service (June 28).

## AUXILIARY AIR FORCE RESERVE OF OFFICERS

## General Duties Branch

I. G. Statham is granted a commission as Flight Lieutenant in Class A (June 28); Sqn. Ldr. H. N. St. V. Norman (Lt. Royal Corps of Signals, R.A.R.O.) is transferred from Class A to Class C (May 21).

**Flying Officer.**—R. C. Richmond, to R.A.F. Station, Duxford, 18.7.35.

## Stores Branch

**Flight Lieutenant.**—M. M. McMullan, to R.A.F. Station, Upper Heyford, 12.7.35.

## Medical Branch

**Wing Commander.**—R. W. Ryan, to Central Medical Establishment, 19.7.35; for duty as President of the Central Medical Board.



# "THE OTHER AVIATION"

Some of the British "Pou-du-Ciel" Aeroplanes Take the Air : "Pou" News



Mr. S. V. Appleby took off from Heston aerodrome in his Carden-engined "Pou"——

**M**ISFORTUNE has attended some of the early flights of British-built "Pous." Mr. S. V. Appleby turned his machine on its back just outside Heston aerodrome last Thursday, and Air-Commodore J. A. Chamier came a cropper while trying his machine at Hendon recently.

"Pou" enthusiasts need not become unduly alarmed by these first mishaps. In France some fifty "Pous" have been completed and flown, and a good many of them have suffered a similar fate. This does not necessarily mean that this type of aeroplane is tricky or dangerous, but merely that piloting it demands a technique rather different from that of the orthodox machine.

In his book M. Henri Mignet warns prospective pilots against taking the machine off in what he terms "the second regime"—that is to say, in a more or less stalled attitude. To do so is not always dangerous, for the "Pou," unlike the ordinary aeroplane, does not go into a spin after such treatment.

Sometimes a "Pou" may get off in a stalled condition due to the centre of gravity being in the wrong place; the machine seems to be fairly sensitive to the c.g. position in relation to the front wing. Other difficulties that have been encountered have been traced to faulty rigging, so that the machine had a tendency to "drop one wing," i.e., to fly with port or starboard wing tip lower than that on the opposite side.

## The Take-off

But even granting that the machine has been correctly rigged and has its c.g. in the right place, there is something to be learned about taking it off. With an orthodox tractor aeroplane the pilot has his style of take-off well under control. By pushing the stick forward slightly he can "hold the machine down" as long as he likes. With the "Pou" it is rather different. When sufficient speed has been attained, the rear wing will lift the tail off the ground, and there is nothing that the pilot can do about it.

As the angle of incidence of the rear wing is fixed, it will be obvious that the extent to which the machine lifts its tail during the run to take off depends upon the loading of the wing and upon the speed. The loading can be increased by having the wheels of the undercarriage farther forward, or by moving the wing itself forward on the fuselage. For a given angle of incidence, determined by the slope of the fuselage decking, the speed attained before the tail comes up will depend upon the loading. As the speed increases during the take-off run, the tail will rise more and more. By keeping the stick forward, the pilot will prevent the front wing from lifting and will thus keep the machine on the ground, but if too great speed is reached the rear wing may raise the tail so high that the airscrew strikes the ground. One believes that M. Mignet has broken many an airscrew in this way. So long, however, as this is not likely to occur, and assuming, of course, that the run available is sufficient, there is much to be gained by getting up a good speed before taking the machine off; and there is less likelihood of getting into the "second regime" accidentally.

In this connection one is irresistibly reminded of the take-off tactics employed by Mr. P. W. S. Bulman in the Hawker "Cygnet" at one of the Lympne competitions. It was a question of getting the machine over a tape stretched on poles some 20ft. up. Most competitors yanked their machines off in the shortest possible run and then began the climb, which, as often as not, resulted in a slow sinking just as the poles were approached. Not so "George." Holding his stick well forward during the run, and keeping it there until he had nearly reached the foot of the poles, he was able to get up a good speed, which he used to carry him over the tape in one terrific "zoom." That is not to suggest that "Pou" pilots should zoom, but that the tactics are as undoubtedly correct for the "Pou" as they were for the "Cygnet" in the competition.

Readers of *Flight* will be glad to learn that the English version of M. Mignet's book on the "Pou-du-Ciel" has now been published. It is a slightly abbreviated version of the original French book, and all the half-tone illustrations have been omitted, a single photograph used as a frontispiece taking their place. One cannot help feeling that the inclusion of a few photographs of the "Pou" from different viewpoints would have been an advantage to prospective constructors. On the whole, the translation has been well done. The original book was full of slangy French, and one does not envy the translator his job of turning this into equally slangy and yet understandable English. A feature which will be welcomed is the inclusion in the book of a list of suppliers of materials, parts and engines. The title of the English version of the book is "The Flying Flea," the publishers are Sampson Low, Marston and Co., Ltd., 100, Southwark Street, London, and the price is 7s. 6d. net.

Mr. W. Laidlaw has nearly completed a "Pou," which, it is hoped, will be fitted with an Anzani engine. This little aeroplane was on view at the At Home held by the R.N. and R.E. Flying Clubs at Mr. Laidlaw's aerodrome, West Malling, near Maidstone, last Saturday.

Sir John Carden, Bart., states that he and Mr. L. E. Baynes have arranged to manufacture parts for the "Pou" and that they are prepared to supply to prospective constructors any or all of the "bits and pieces," or, to anyone who so prefers, the complete machine ready to fly, fitted with the Carden-Ford engine. Enquiries should be sent to Abbott-Baynes Aircraft, Farnham, Surrey.

Mr. Alfred Richard Weyl writes that Zander and Weyl, of Luton Road, Dunstable, are now constructing parts for the "Pou" and that they are prepared to meet all demands of private constructors for wooden and metal parts, and also for the complete machine.



—and landed in an allotment just outside. The plough furrows proved his undoing. On grass he would probably have landed safely. Even as it was, surprisingly little damage was done. (Flight photographs.)

# COMMERCIAL AVIATION

## — AIRLINES — AIRPORTS —

### CROYDON NEWS

*More Canine Importations : Linking-up With the Atlantic : The Gambler's Special :  
Storm in a Teashop—Part III : Those Newspapers : The Coach-crasher*

ONE night last week—"Air War Week"—saw a squadron of blue-, yellow- and red-nosed "Bulldogs" put in at Croydon owing to night mist at Biggin Hill. They took off about 9 a.m. next morning most impressively, after which civil aircraft crept timidly to the tarmac. One red-nosed "Bulldog" would not start, and a man with a road mender's hammer approached it, after which it moved off. Don't ask me why. There are mysteries of R.A.F. maintenance too deep for civilians.

Imperial Airways started a new line of business by arrangement with the French Line—steamers, not Air France—whereby passengers from the company's liners *Ile de France* and *Normandie* at Plymouth may fly to London "on demand" in a D.H. 86. On Friday eight passengers were thus brought to London, and one of them caught the 9 a.m. "Imperial" machine for Budapest. He thus travelled 4,200 miles from New York in six days, doing 3,000 miles in five days by sea and 1,200 miles in one short day by air.

#### Brisk—and Snappy

Another new "Imperial" enterprise is a daily express from London to Le Touquet, leaving Croydon after business hours at 6.15 p.m., and arriving at Le Touquet 7 p.m., and leaving again 9.15 a.m. next day to arrive Croydon 10 a.m.; so, after a night's gambling on the Continent, the British business man can be at his desk, brisk and snappy, before 11 a.m.

The buffet was opened to all and sundry during the week. Much dictatorial ceremony attended its closing, but its opening was positively stealthy, no man seeing the abashed removal of those nice, new, tersely-worded notices. It was a mistake to close the place to those most entitled to use it, but it was, perhaps, a worse one to reopen it once the decision to close it was announced. There is no truth in the rumour of an iron hand (malleable) suitably shrouded in a black velvet glove being buried darkly at dead of night in one of the airport's numerous excavations.

K.L.M. has benefited greatly from a gold rush from Holland to England. Between Thursday and Saturday last about seven tons were imported to this country, the value being approximately £1,587,414.

An incredible picture appeared in an evening paper last week. It was said to represent an R.A.F. flying boat taking off the water for a flight to Singapore, and what it showed was an Air France Potez standing on the tarmac at Croydon with the Air France manager standing in front of it. Another interesting bit in a paper, incidentally, was about a "false landing" made by an Air Force machine during the recent "exercises." False landings, it should have been explained by the writer, are made for the purpose of deceiving the enemy.

Capt. O. P. Jones has a photograph of a town somewhere in Europe or Asia for identification. It is so planned that white roads, against fields, trees, or blocks of houses, resemble a spider's web in pattern. It is the property of an enthusiastic air traveller and photographer seventy years old, who has taken thousands of snapshots all over Europe and in the East, and this one has no identification marks on it.

British Continental Airways are well satisfied with progress so far. Full loads are often carried and there are always a reasonable number of passengers on the Le Zoute, Ostend and Brussels service.

A curious thing occurred recently when a respectable stranger took his seat unobserved in one of the passenger cars about to leave for London. The official in charge counted heads in the bus and gave the "all clear" to the driver, who departed. A moment later a passenger appeared from round some corner and asked the whereabouts of the bus, which, incidentally, had his luggage on board. The company had to get him a car quickly!

Mr. G. M. Huggins, Prime Minister of Southern Rhodesia, took advantage of the 6 a.m. Imperial "mail service" to Brindisi last week, and caught the Empire service at Brindisi, thus saving a day.

A. VIATOR.

### HESTON HAPPENINGS

IN the new central repair station (a description of the official opening of which appeared in *Flight* last week) they are erecting a high platform of the kind installed at the Zoo for mounting elephants. Apparently Mr. Halliburton is not coming on to Heston after his Hannibalese crossing of the Alps, nor is somebody's serious suggestion of using an elephant for shifting large aircraft to be adopted. It appears that they are building an elevated perch, control tower or eyrie for the foreman, who is unable, from ground level, to keep 32,000 square feet under constant observation. The area mentioned is at present occupied by a couple of dozen aeroplanes, large and small—minor repairs to the east, overhauls in the centre, and damaged aeroplanes to the left. It nevertheless looks comparatively empty.

The service department held its own private celebration on moving into the new building. The programme included a 100 yards race held inside the hangar. The managing director, the general manager, the chief accountant and the catering manageress all showed a very pretty turn of speed, and a good deal of subdued betting took place. Messrs. MacDonald and Groves won in a canter.

Commercial Air Hire, Ltd., has just taken delivery of the third Monospar S.T.4 to join its fleet. The machine has been fitted with a small wireless set specially designed for the firm by the Marconi folk. It is a lightweight set, run from the ordinary lighting battery already in the machine, and a rotary converter. In this way the weight and bulk of a generator and

extra battery is eliminated. The first tests, which were carried out by Marcom's engineers over Richmond Park, were successful in every way, no difficulty being experienced in getting Manchester, Abbeville and Le Bourget at the first call. The other C.A.H. Monospars are to be equipped with a similar arrangement.

Le Touquet is rapidly becoming what Niagara Falls is in the United States so far as honeymoon couples are concerned. Air Dispatch, Ltd., had a busy week with special charters, and the pilots suggest keeping one Monospar, suitably decorated with old boots, and so forth, for the sole use of the happy couples.

Since the opening of the new swimming pool at Croydon passengers have been going across from Heston in the Inner Circle Air Line, and, after trying out the new pool, returning to Heston in the cool of the evening.

#### To Biarritz

BETWEEN to-day, August 1, and September 16 Air France will, in conjunction with Air Services, operate a fast daily service to Biarritz. Passengers will leave Croydon at 10.30 a.m., reach Bordeaux on the Madrid service at 3.35 p.m., and will then be flown in a "Gipsy" Farman to Biarritz, arriving at 4.40 p.m. The returning service leaves at 9.25 a.m., and reaches Croydon at 3 p.m. The single fare will be £12 5s.



**Commercial Aviation****NEWCASTLE AIRPORT OPENED**

*Sir Philip Cunliffe-Lister Hands Over Licence : A Fine Landing Ground and Buildings :  
Wanted—a Service*

**U**NDER a sunshine-and-storm sky smeared with the dun smoke of Tyneside factories, Newcastle's municipal airport at Woolsington was opened last Friday, to the accompaniment of fitting civic pomp and ceremony, by the Secretary of State for Air, Sir Philip Cunliffe-Lister.

It was obviously a proud moment for those City elders who, in their dour, determined Northumbrian way, had looked so wisely and courageously ahead through the murk of depression which still clings to Tyneside.

The 107-acre landing-ground lies beside the Newcastle-Otterburn road, 6½ miles north-west of the City centre. The airport, which is being administered by the Newcastle Aero Club (under the presidency of Col. Sir Joseph Reed, the chairmanship of Capt. J. D. Irving, and the secretaryship of Mr. F. L. Turnbull) has been laid down on extremely modern lines. Its equipment is really adequate without being unnecessarily lavish.

The clubhouse, a most pleasant little building, includes sleeping quarters for visitors, and the single medium-sized hangar and workshops are well equipped. There is also a separate and unobstructed station for the fire tender, and an extremely well designed refuelling station, with quick-delivery electric pump extension arms at each corner.

The preparation of the ground was the work of the En-Tout-Cas Co., and the landing area gives a run of approximately 700 yards east to west, 750 yards north to south, and from 950 to 1,000 yards on various diagonals. Most of the contracting was the work of local firms, while a Newcastle architect, Mr. Sydney Wilson, was responsible for the design of the buildings.

Perhaps the most noteworthy aspect of the Woolsington enterprise is the fact that the City Council owns no less than 345 acres in the area, so, if need be, the present size of the airport can be trebled.

But to return to the opening ceremony. Punctually at noon the handsome D.H. "Rapide" of No. 24 (Communications) Squadron came whistling in, and was taxied by its pilot, Flt. Lt. R. Nash, up to the dais. From it stepped Sir Philip Cunliffe-Lister, accompanied by his private secretary (Capt. T. L. Dugdale, M.P.) and Col. F. C. Sheldermine, the D.G.C.A.

**"Buying Big"**

Sir Philip was received by the Lord Mayor and City officials. After making a circuit of the aerodrome by car, he was welcomed by the Mayor, and in reply made a speech that was a model of distinctness and succinctness; he said, *inter alia*, that Newcastle was not afraid to "buy big," with a view to future developments. The laying-out of such an airport as this, he said, would have been a creditable enterprise anywhere; here it was particularly creditable in view of the fact that the district was one of those so badly stricken by trade depression.

Sir Philip then formally handed over the licence and declared the airport open; the National Anthem was played, the Civil Air Ensign unfurled, a Verylight fired, and a roar heralded the appearance of the three famous red-and-white striped "Tutors" from the C.F.S., as they dived, wing-tip to wing-tip, in a fine salute to those on the platform.

The flight, under the leadership of Flt. Lt. D. J. Waghorn, then proceeded to "push their wheels out on top" (as a Sweet Young Thing put it), and give their now celebrated display of inverted flying; it looked far more effective than it did at Hendon, because it was all done at a far lower altitude. One wonders if, by long-inverted usage, the pilots' circulatory systems have not now remodelled themselves on the lines of the "Tutors' " special fuel-supply arrangements. (How about *Per Sanguinem ad Capita* as a revised motto?)

The open-air formalities having concluded, the hosts and 250-odd guests (which included a score of visiting pilots) packed themselves into cars and buses for the city and the official luncheon, while Sir Alan Cobham's Display launched itself into the sky in its usual slick manner for the edification of a big crowd which was content to feast on thrills.

Newcastle was rightly so very, very pleased with the materialisation of its dream that we must forgive it the orgy of verbiage which followed the civic luncheon in the Old Assembly Rooms. The Mayor expressed the hope that before long there would be aircraft factories at Woolsington; Sir Philip praised the Airport Committee's enterprise, appealed for R.A.F. trades recruits from among Newcastle's skilled crafts-



The Lord Mayor, Ald. R. S. Dalgliesh, welcomes Sir Philip Cunliffe-Lister as he steps from the Communications "Rapide"

men, and enlarged at length on his plans for getting British aviation really moving by invoking the active assistance of other Government departments, such as the Post Office and the Ministry of Health; Ald. Sir Stephen Easton (chairman of the Special Aerodrome Committee) appealed to Sir Philip for D.F. facilities at Woolsington as soon as might be; Lord Ridley (chairman, North-Eastern Development Board) said that several enquiries about Woolsington sites had been received from aircraft firms; and Capt. Irving (chairman of the club) put a snap into the tail of the oratory with a speech that was both brief and really audible.

In the evening there was further eloquence at a dinner given to certain guests by the Lord Mayor at the Mansion House.

Next day, Saturday, was devoted to the London-Newcastle Air Race, a report of which appears in the "Private Flying" section of this issue.

It is rather ironical that the day after Woolsington opened Newcastle's only air service, that of North-Eastern Airways, closed down; F/O. Wheeler, with their "Envoy," made the last regular journey on the Saturday as a competitor in the London-Newcastle race. Lack of D/F was the primary reason for the abandonment; but later, during the Woolsington festivities, a member of the Airport Committee announced that things looked more hopeful as regards Air Ministry assistance with radio, so before long, perhaps, Newcastle will be aerially connected with London and Edinburgh once again. North-Eastern, of course, are turning their energies in the direction of Switzerland by the recently announced Alp Air Ltd. project.

**The Amsterdam-Hull Service**

**A**FTER various rumours and counter-rumours the K.L.M. Amsterdam-Hull-Liverpool service was, after all, suspended last Friday. On that day Alderman Frederick Till, chairman of the Hull Development Committee, received a letter from Mr. Plesman, managing director of K.L.M., in which Mr. Plesman said he felt sure he could again count on Hull's hearty co-operation when the service reopened.

### A Lisbon Service Soon?

**C**RILLY AIRWAYS, LTD., are negotiating with the Portuguese Government with a view to establishing a mail and passenger service to Lisbon.

### Now Hastings

**A** 360-ACRE aerodrome, costing £40,000, is a part of Hastings new town-planning scheme. Part of the aerodrome, suitable for light aeroplanes, will be opened this year.

### "Merlins" for Mails

**T**ATAS AIRWAYS, after satisfactory trials, have now started their Karachi, Bombay and Madras mail and passenger service with their new Miles "Merlins."

### "Pegasii" for Polish "Douglii"

**T**WO Douglas D.C. 2s ordered by the Polish L.O.T. Company are being fitted with 690 h.p. Bristol "Pegasus III" medium-supercharged radials. The normal power plant of the Douglas is the Wright "Cyclone."

### A Day's Outing

**"FIFTY-FIFTY"** air and sea trips is a Hillman innovation which should prove popular. In conjunction with the General Steam Navigation Co., Ltd., the company has arranged a schedule whereby passengers will be able to fly from London to Ramsgate, spend five hours there, and return by the well-known *Royal Eagle* pleasure steamer. Passengers will leave King's Cross Coach Station at 8 a.m., whence they will be taken to Essex Airport. Leaving the airport at 9 a.m., they will arrive at Ramsgate Airport at 9.45 a.m.

At 3 p.m. the *Royal Eagle* will leave Ramsgate, cruising up the Thames via Gravesend and Woolwich, and docking at the Tower Pier at 10 p.m. The combined fare for the round trip is 25s. 6d.

The following Hillman Sunday services, which have been run experimentally since the middle of June, have been cancelled owing to the small demand:—London to Paris, 9 a.m. and 3 p.m. services both ways. London to Antwerp: From London, 2 p.m. and 6 p.m.; from Antwerp, 10 a.m. and 2 p.m. London to Glasgow: From London, 10 a.m.; from Glasgow, 8.30 a.m. Hull to Belfast: Service cancelled both ways.

### K.L.M. and Its Pilots

**P**EOPLE have asked why K.L.M. found it necessary to cancel a number of European services through shortage of commander-rank pilots when, after all, only two pilots were lost in the three recent accidents to the company's aircraft.

The fact of the matter seems to be that before these accidents the company was operating no fewer than forty daily services in Europe alone, as well as the twice-weekly return flight from Amsterdam to Batavia. It is true that of these forty services a handful were short internal lines, and two of them were run in co-operation with other companies.

Since the beginning of this year K.L.M. has been so unfortunate as to lose five pilots of commander rank, and at the time of the recent accidents four or five other pilots were away on sick leave.

Those away with minor ailments were not, of course, recalled, for the Company is the only one in Europe with its own medical service; it has a resident medical officer at Amsterdam Airport, apart from the Government medical department, which periodically examines all civil pilots in much the same way, and just as stringently, as is done here in England.

The Dutch company, with a very great deal of flying to do, found itself short of about ten commander pilots, and with no source of supply such as bigger countries, with plenty of ex-Service pilots of experience, might tap in emergency. Holland has a very small air force, and no commercial or civil companies except K.L.M.

It would have been possible to have promoted a number of "first officers" not yet fully trained to fly big air liners on difficult routes in all sorts of weather, but to do so would have been a departure from the company's system in such matters, which is founded on solid Dutch common sense. A commander is not made by the mere process of placing an extra gold braid ring on his sleeve, and the K.L.M. point of view is that it is better to cancel a number of unimportant services rather than to put any strain on the organisation.

A great deal of unnecessary fuss was made in the newspapers over the cancellation of half a dozen comparatively unimportant services. Those cancelled between Croydon and the Continent were purely local services which gave no long-distance commissions in either direction at Amsterdam.

The services remaining—three in each direction daily by K.L.M. and one daily each way by D.L.H.—give the public four opportunities of travelling to or from Holland, and the three K.L.M. services still operating are "key lines" which connect London with Prague, Copenhagen, Malmö and Berlin respectively.

The answer to the question whether K.L.M. had not sufficient reserves of commander-class pilots is simple. The Netherlands company had sufficient, but not a very large number, nevertheless. It would be foolish, therefore, to throw those reserves into the front line either for the sake of appearances or to keep going a number of lines which had no very great importance.

### "Electra"-fication

**T**WENTY Lockheed "Electras" were delivered during the first six months of this year. Further orders were announced at the end of that period.

For use by its Eastern Air Lines division, North American Aviation, Inc., has ordered five "Electras" with Wright "Whirlwind" engines, while Pan-American Airways placed a repeat order for three machines of the same type to be powered with Pratt and Whitney "Wasps."

With the delivery of its seventh "Electra" Braniff Airways is employing twin-engined machines on all its routes from the Great Lakes to the Gulf of Mexico.

### Kingsford-Smith's Mail Plans

**A**IR-COMMODORE SIR CHARLES KINGSFORD-SMITH is going ahead with plans for an Australia-New Zealand bi-weekly air service across the Tasman Sea. According to a Reuter message, Sir Ethelbert Ransom, acting Premier of New Zealand, declares, however, that they might embarrass the Empire air mail scheme as a whole.

"Although Sir Charles's enterprise and intrepidity in blazing what might be termed the 'Tasman Sea trail' are well appreciated by the Government and people of New Zealand generally," said Sir Ethelbert, "they do not afford him any prescriptive right to an airway between New Zealand and Australia."

"The Tasman service must be considered as part of a comprehensive Empire scheme to accelerate mails between New Zealand and overseas countries, and reduce the postage between Britain and New Zealand to 1½d. per half-ounce."

"It would hardly be keeping faith with Britain, and would certainly be an embarrassment, to say the least of it, to the broad scheme as envisaged at the Sydney conference last February, were New Zealand at this stage to become prematurely committed to a separate proposal."

### Steel Tubing

**U**NDER the title of "Steel Tubes for Aircraft," Accles and Pollock, Ltd., of Oldbury, Birmingham, have produced a new and highly informative catalogue. It deals with the seamless steel sections developed for the aircraft industry, these being classified as ovals, squares, streamlines, spars and collector ring ovals.

## Forthcoming Events

Club Secretaries and others are invited to send particulars of important fixtures for inclusion in the list.

Aug. 10-20. Second International Austrian Alpine Flight.  
Aug. 17. Round the Isle of Wight Air Race and Portsmouth Air Trophy.  
Aug. 24-25. Third International Flying Meeting, Lympe.  
Aug. 24—Sept. 1. National Gliding Competition, Sutton Bank.  
Aug. 24-25. Cinque Ports Club. International Flying Meeting and Wakefield Cup Race.

Aug. 24-30. Raduno del Littorio, Rome. Reale Aero Club d'Italia.  
Sept. 6-7. King's Cup Air Race. Start and Finish: Hatfield.  
Sept. 14. Cinque Ports Club. Folkestone Aero Trophy Race.  
Sept. 15. Gordon Bennett Balloon Race, Warsaw.  
Sept. 21. London-Cardiff Race. Cardiff Aeroplane Club.  
Oct. 12-28. International Aircraft Exhibition, Milan.





## Topics of the Day

### The Cost of Ownership

ONE of the most usual questions asked by a prospective owner—or even by the ordinarily interested person—concerns the cost of running a light aeroplane. Naturally enough, it is impossible to give any hard-and-fast figures, as these depend on the type of machine chosen, to the attention given to it, and, finally, to pure luck.

Nevertheless, there must be a number of people who have not the faintest idea of this cost, or who imagine that ownership is necessarily a very expensive business. I am giving one particular owner's figures as a matter of interest and in the hope that one or two others will defeat an innate hatred of penmanship or of "accounts" and will give me theirs.

In this particular case the machine is a "Gipsy I Moth," and the owner keeps it at a semi-private aerodrome where he has his own hangar. For the privilege of having this he pays a purely nominal rent of £4 a year, and this sum also covers the use of the aerodrome itself. Normally, rented hangarage would cost between £50 and £100 a year, a sum which would again cover the use of the particular aerodrome.

### Running Expenses

THE actual yearly running costs vary, of course, with the use to which a machine is put. In this case the owner does a little more than 100 hours in a year, and this can be taken, I think, as a fairly average figure for the amateur who does not take his flying too seriously.

His machine uses something rather less than six gallons an hour, though here, again, the consumption varies with the throttle opening. Taking six gallons an hour and 100 hours a year as the figures, the fuel bill for the year will be £45. If one has an underground tank the petrol can be purchased in bulk at 2d. a gallon less, a saving which can be well worth while over a long period. The fuel can, as previously explained, be pumped up at intervals from this storage tank into a gravity tank, from which it can be fed to the machine as required.

The oil consumption, of course, is not a very heavy item in itself, but the oil must be drained out every twenty-five hours. The owner in this case buys his oil in ten-gallon drums and filters the half-used oil before using it again in his cars. Only a part of the first cost of his oil can be fairly debited as a running expense. Needless to say, the filtered oil is fit for another thousand miles or more in a normal car, as twenty-five hours' running in an aero engine is equivalent to a mere eight hundred miles on the road. Five pounds would, in these circumstances, fairly cover the cost of the oil used in a year's flying.

### Repairs and Overhauls

OVER and above the actual yearly repair and overhaul expenses, one has to pay five guineas to the Air Ministry for the annual Certificate of Airworthiness examination, which itself should not result in repairs

costing more than £25, so long as no vital replacements are necessary.

A number of private owners feel that the idea of calling for an annual C. of A. is unfair in the case of a machine which only flies for 100 or 200 hours. One owner suggests that, in the case of any machine on which the hours flown total less than, say, 500, the C. of A. might be postponed for a further period of six months at the option of the inspector.

Occasional repairs, examinations and minor replacements have cost this owner a little more than £10 a year, but, once again, such figures can only be a matter of guesswork.

Unless one goes in for a comprehensive insurance policy—in which case the yearly figure might be anything up to £100, according to the experience and previous record of the pilot concerned—this expense is not very great. To insure against third-party risks and against the possibility of an accident to anyone who is swinging the propeller, the figure is in the region of £10 yearly.

### The Grand Total

IT will be seen, then, that running and overhead costs may be as little as £100 a year, but are not, in any case, likely to be very much less. In addition, one should, to be honest, add the loss due to depreciation and to the interest on the capital expended.

A second-hand machine of good family does not depreciate to anything like the extent experienced in car ownership, but, on the other hand, the maintenance expenses are proportionately higher. In other words, a light aeroplane does not lose its value quickly, because money is being spent all the time to keep it in safe flying trim. The next owner knows, from an examination of the log books, almost exactly what the machine is worth, and this value falls only very slowly once a machine is obsolescent—though not obsolete.

### No Fair Comparison

TAKING the average ground cruising speed as 75 m.p.h., then in 100 hours' flying the mileage is 7,500, and the "Gipsy I Moth," which is taken as an example, is being run for about 3½d. a mile—which is not an astoundingly high figure. Depreciation, interest loss and a comprehensive insurance policy would probably increase this to a matter of 8d. or 9d., but this figure would be appreciably reduced if a large mileage was covered during the year's running.

However, at present, and probably for many years to come, the value of a light aeroplane will not be capable of being assessed on a mileage basis. If one worked out, for instance, the mileage costs of a yacht or of a cabin cruiser, the result would be staggering.

Meanwhile, a fair proportion of owners use their machines for extensive business trips, and the great majority treat them as a means of very pleasant relaxation.

INDICATOR.

# FROM THE CLUBS

## *Events and Activity at the Clubs and Schools*

### TOLLERTON

Flying was practically nil on three days of the week owing to bad weather, but during the week members flew 21½ hr. in all. One new associate member joined the Club.

Cross-country flights were made to Skegness by Mr. T. W. Shipside, and to Bircham Newton by Mr. and Mrs. L. F. Partridge.

### REDHILL

Six new members joined the Club during the week. Two more blind flying certificates have been obtained. On Saturday, July 20, Mr. Vaughan Fowler and Mr. Bey demonstrated the B.A. "Eagle" and "Swallow" machines.

Flying time was 74 hr. 50 min.

### CAMBRIDGE

The aerodrome has been used by the R.A.F. as an emergency landing ground during the night flying operations and on Wednesday night one machine landed in a mist.

Messrs. Gatty and Whittet have passed their "A" licence tests and three other members are about to complete their tests.

Flying time totals 45 hr. 30 min.

### BRISTOL AND WESSEX

Mr. D. A. Taylor completed the "A" licence tests during the week and Mr. P. Dumphy, another of the Air League scholars, made his first solo flight.

There is one new pilot member—Mr. B. D. C. Wilkinson. Sqn. Ldr. J. Everidge and Mr. C. Nuttall have become "ordinary" members.

### MIDLAND

The flying times for the week ending July 25th were dual 16 hr. 30 min. and solo 26 hr.

New members include Messrs. O. H. Corbett, T. R. N. Whyte and Capt. S. J. Smith (ordinary), and Messrs. J. H. A. Wells and A. B. I. Dick (flying).

Mr. D. Scott successfully passed his "A" licence tests.

Cross-country flights were made to Sywell, Coventry, Hucknall, Hanworth Park, Braunstone, Croydon, and Hatfield.

### LIVERPOOL

Flying time (51 hr. 50 min.) has been kept low owing to bad weather over the week-end.

Between March and May no fewer than sixty-one new members joined the Club. Of this number twenty-seven were flying members. Five members obtained their "A" licences.

The clubhouse will be closed and flying facilities will not be available at Speke from August 5-18 inclusive, or at Hooton from August 26 to September 8 inclusive.

### HANWORTH

Flying time for the week totalled 62 hr. 15 min.

Mr. E. A. Sams made his first solo and Mr. G. Sutton passed his "A" licence tests.

Charter trips during the week included one to Wakefield with Capt. Euan Wallace, M.P. Cross-country trips were made by members to Shoreham, Cambridge, West Malling, and Southsea.

A very successful flying meeting and garden party was held at Aldenham last Saturday in aid of the funds of the British Empire Cancer Campaign.

Mr. F. Woolman, who is home from South America and is learning to fly before he returns, has become a Hanworth member.

### BROOKLANDS

There are five new members to welcome. These are Messrs. Sainsbury, Scott, Nazlounian, Barron and Banford.

Col. Strange is taking a course of instrument flying. Messrs. Elliott, King, Davis and Baker are to be congratulated on having accomplished their first solo flights. Miss Knight-Bruce now joins the ranks of the private owners, and Mrs. Cree has successfully completed all tests for her "A" licence.

A party of members flew in five machines to Le Touquet to see the golf tournament and all accomplished the journey without incident with the exception of one machine, which, we understand, was unavoidably delayed at Dieppe.

### HATFIELD

With the return of fine weather has come a return of activity at the R.A.F. Flying Club. Applications for membership continue to arrive almost daily, and the four machines now owned by the Club should find plenty of work in store for them.

At the London Aeroplane Club the flying time for last week was 115 hr. 20 min.

New members are Miss Challen, Messrs. E. E. Fennell, G. H. Boutwood, and J. M. Connell. Messrs. A. M. Carroll, R. D. Morrison and R. L. Moss completed their night flying tests, and Mr. A. I. Sladen completed his first solo flight.

Dr. G. C. Curson, Messrs. T. J. Campbell, M. Constant, W. A. K. Grant, G. F. Luckie, T. K. Mayo, G. Oliven, A. I. Sladen, and D. W. Sutton completed the tests for their "A" licences.

### WITNEY AND OXFORD

For the week ending July 27, 1935, flying hours were 24, of which 14 represented solo flying.

Mr. L. F. Henstock has made his first solo flight. Club machines made cross-country flights to Reading, Castle Bromwich, and Leicester.

### YORKSHIRE

Club machines flew approximately 53 hr. last week, despite bad weather, and trips were made to London, Sywell, Manchester and West Hartlepool.

Mr. G. C. B. Charlesworth has joined the Club as a non-flying member, and Mr. S. G. Beaumont has passed his "A" licence tests. Mr. H. Gledhill has done his first solo.

### HAMPSHIRE

The blind flying course is proving very popular.

Mr. J. Winning has gone solo and Mrs. E. E. Leathes and Messrs. M. F. Taylor, I. E. Jones, H. P. A. Suther, and T. C. N. Pearson have become members. Mr. E. G. Barry has qualified for his "A" licence.

The flying time for June was 241 hr. 40 min.

### NORTHAMPTONSHIRE

Last week Mr. G. F. K. Donaldson took over as chief instructor of the Northants Aero Club, in place of Mr. E. C. Goldsmith, who is now instructing on the R.A.F. Reserve School at Sywell.

Flying times showed a considerable increase. An excellent first solo was accomplished by Mr. W. H. T. Smith. Col. A. R. Liddell and Mr. C. F. Westley have renewed their "A" licences.

### READING

Dr. Smith and Mr. Bird have made first solo flights and Mrs. Handley Tracy has become a pupil.

The Club was surprised and delighted to welcome No. 40 (B) Squadron from Abingdon, which dropped in to breakfast just after 7 a.m. one morning after having "bombed" London.

At Wheatley on Saturday F/O. Lawn demonstrated a "Hawk Major" and Mr. C. A. Nepeen Bishop showed off a "Cirrus III" model.

Flying times were 65 hr. 10 min. dual and 19 hr. solo.

### HERTS AND ESSEX

At Broxbourne flying time for week ending July 24 was 108 hr. 01 min., of which 37 hr. was dual.

Mr. C. Burton Robson made his first solo flight. New members are Messrs. P. C. Manchanda, G. A. Pierrot, and G. F. Madin, the latter from Western Australia.

Club machines have made cross-country flights to Ipswich, Bristol, Norwich, Southampton, Peterborough, and Lymington.

The aerobatics competition for the "Mollison" Challenge Cup will be held on August 4.

### KENT

Thirty-eight hours were flown during the week. Messrs. Videan, Jones, Daniels and Saben have become flying members and Mr. Forrester has gone solo. Messrs. Jones and Dalton passed their "A" licence tests.

One more new pupil under the Young Pilots' Fund scheme has been allotted to the Club.

Two Club machines visited West Malling on the occasion of the meeting there on July 27. Flt. Lt. Barringer landed in a field adjoining the new Guest House, Sarenden Manor, near Ashford, where it is proposed to have a landing ground.

### CINQUE PORTS

Five officers from the Royal Berkshire Regiment are now qualified pilots. They are Captains Sinclair and Rew and Messrs. Harold Finch, William Annesley and Drake-Brockman.

Many interesting people have visited the Club recently and expressed their admiration of the newly extended buildings. Mr. Noel Coward came over on Sunday last with Raymond Massey and his wife (Adrienne Allen) and Mr. and Mrs. Laurence Olivier. Mr. H. R. Presland's "Puss Moth" is undergoing renewal of C. of A. and he came in on Sunday with Group Capt. Robert Leckie. Major L. F. A. Wouters, Air Attaché at the Belgian Embassy, lunched at the Club while en route for Croydon. Herr Nikolaus von Eitz arrived with a formation that included four new "Tiger Moths" and a D.H. "Dragon" for the Austrian Aero Club at Vienna.

Mr. F. A. Lister, of Bromley, is a new member and he has started training for his "A" licence. Mr. S. E. "Eddie" Edwards has passed his "A" licence tests. There were four first solos during the week—three of them on Thursday. These were completed by Mr. A. Bristow, Mr. Drake Brockman, and Mr. Finch and Mr. Engel. Mr. Provost, an architect and Belgian war pilot, is over again and has been putting in some flying hours.

For the week ending on Thursday last, flying time for the week registered 74 hours.



**Private Flying****CARDIFF**

Flying time for the week of July 16-22 was 13 hr. 45 min. The Club has almost finished testing candidates for the Scholarship Scheme in conjunction with the *Western Mail*; there are now about ten more entrants. The twelve finalists will be selected, and from this number, the four who will be receiving free tuition. Four new flying members have joined during the past month.

They are: Mr. Paul Curran, Mr. D. H. R. Morgan, Mr. C. F. Upham and Mr. David Wallace. There are also six new social members. Two members, Miss Pamela Jenkins and Mr. G. Owen Rees, have qualified for their "A" licences.

It was decided at a meeting of the directors to hold the London-Cardiff Air Race on September 21, 1935. There is a possibility that it will be followed by a dinner and dance in the evening.

**LONDON—NEWCASTLE****Flt. Lt. J. B. Wilson, in the B.A. "Eagle" (Gipsy Major) Wins the Newcastle Club's Race**

Flt. Lt. Wilson, the winner (right), standing in front of his B.A. "Eagle" in company with Mr. L. Lipton, who was second in a "Moth" with his son (left) as passenger.

Gardner, lost quite a lot of time in locating Woolsington.

F/O. V. J. Wheeler, flying North-Eastern Airways' "Envoy" on its regular daily run, with passengers on board, finished fifth and made highest speed of the day with a figure of 160.97 m.p.h.

The limit machine, Mr. E. F. Walters' Gipsy I "Moth," had retained the lead as far as Yeadon (which is 85 miles from Woolsington); competitors were required to turn at Yeadon and to pass through there for identification. "Looking for Yeadon" became the jest of the day, and more than one pilot was seen to be "Hexploring bevery havenue." Among them was Mr. Louis Fontes in his very pretty single-seater "Hawk" (Gipsy Six) with covered-in cockpit; he spent so long Yeadon-hunting that he began to get anxious about fuel, and called at Usworth, a service aerodrome on the coast.

The blanks in the accompanying results sheet indicate those who arrived too late to be timed.

**THE NEWCASTLE TROPHY RACE.**

Machine.	Entrant.	Pilot.	Start.	Actual Times.		Speed.	Placing.
				m. s.	h. m. s.		
"Moth"							
(Gipsy I) ...	E. F. Walter ...	Entrant ...	Zero	2 36 3	101.12	6	
"Moth"							
(Gipsy II)...	J. R. Micklethwait	Entrant ...	2 40	2 32 21	103.58	5	
"Moth"							
(Gipsy III) .	L. Lipton ...	Entrant ...	10 5	2 18 22	114.04	2	
"Avian"							
(Genet Maj.)	A. H. Tweddle...	Entrant ...	26 34	—	—	—	
"Active"							
(Hermes IIb)	A. Henshaw ...	Entrant ...	30 5	N.S.	—	—	
"Eagle"							
(Gipsy Maj.)	Brit. Air Mfg. Co.	J. B. Wilson	34 12	1 51 31	141.50	1	
"Gull"							
(Gipsy Six)	P. Mursell ...	C. E. Gardner	49 54	1 38 55	159.53	3	
"Gull"							
(Gipsy Six)	S. L. Turner ...	Entrant ...	40 54	—	—	—	
"Hawk"							
(Gipsy Six)	C. O. Powis ...	T. L. Rose ...	51 3	2 7 39	159.46	7	
"Envoy"							
(2 Lynx) ...	N.E. Airways ...	V. J. Wheeler	56 27	1 38 2	160.97	4	
"Streak"							
(Gipsy Maj.)	F. B. Warran...	P. W. Avery	58 27	—	—	—	
"Hawk"							
(Gipsy Six)	L. Fontes ...	Entrant ...	58 56	—	—	—	

AS related in "Commercial Aviation" in this issue, Woolsington (Newcastle) Airport was formally opened last Friday. On the Saturday the official celebrations continued, and were marked by the Newcastle Aero Club's sixth annual London-Newcastle race for the Newcastle Trophy and other prizes. A dozen entries had been received, and all but one left the starting-point, Brooklands. Capt. Dancy and Mr. Rowarth were responsible for the handicapping, and the Clerk of the Weather also did a little on his own, sending along a most unpleasant mixture of low cloud, rainsqualls, and a wind which, at the northern end at all events, was of the order of 25 m.p.h., gusting much higher. Its exact direction, too, seemed problematical; while most competitors said that they had found it to be on the beam, one or two reported a tail wind, while another was equally positive that at times it was dead ahead. It was all, probably, a matter of altitude.

However, Flt. Lt. J. B. Wilson, who had left Brooklands in the B.A. "Eagle" (Gipsy Major) 34 min. 12 sec. after the limit machine, picked up five places and shot over the line at Woolsington, a winner at the very excellent average of 141.50 m.p.h.; he reported an extremely bumpy but otherwise uneventful and trouble-free journey.

Mr. Lawrence Lipton, who had left 10 min. 5 sec. after the limit man, and who carried as passenger his thirteen-year-old son, finished second in his "Moth" (Gipsy III) 2 min. 44 sec. after the "Eagle," having averaged 114.04. Mr. P. Mursell's "Gull" might have secured that honour, but its pilot, Mr.

Of what are popularly known as "untoward incidents" there was none, though Mr. A. H. Tweddle did have to put his "Avian" down in a field near Catterick.

The winning machine's equipment included Claudel-Hobson carburettor, B.T.H. magnetos, Lodge plugs, Reid and Sigrist turn indicator and Smith's instruments.

Some of the arrivals at Woolsington in the high wind were entertaining, pilots motoring their machines on to the ground in a most hectic fashion. If one wanted to see perfect technique one only needed to watch the pilots of the Cobham Display, which was taking place at the same time; and, wind or no wind, Flt. Lt. Tyson was observed to be doing his famous—or notorious—low-altitude inverted flight along the enclosures, "ducking his head to get over the loud-speaker van," as somebody put it.

That evening, in Newcastle, the club staged a dinner-dance for its guests; they understand these things in the North, and it was an immensely cheery party.

And so to another bout of sporting flying: On Sunday afternoon the Yorkshire Aeroplane Club staged its race from Woolsington to Yeadon for cash prizes, and though the entry was a very small one—only four people actually started—everybody had a good, if bumpy, time. F/O. Wheeler, starting from scratch in the "Envoy," got home 1 min. 9 sec. ahead of Flt. Lt. Wilson's "Eagle," with Mr. Lipton's "Moth" third. The "Envoy" averaged 173.96 m.p.h.